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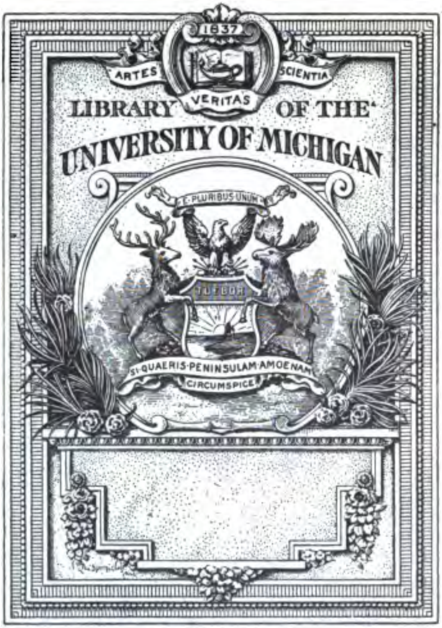
DRILL REGULATIONS
FOR
FIELD ARTILLERY
UNITED STATES ARMY
(PROVISIONAL)

1908



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DRILL REGULATIONS
FOR
FIELD ARTILLERY
UNITED STATES ARMY
(PROVISIONAL)

1908

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WAR DEPARTMENT,

Document No. 323

OFFICE OF THE CHIEF OF STAFF.

017M10 C.S.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF STAFF,
Washington, May 14, 1908.

These Provisional Drill Regulations for Field Artillery embrace:

First. General principles.
Second. Dismounted instruction.
Third. Firing instruction.
Fourth. Mounted instruction (part of).
Fifth. The service of information and communication.
Sixth. Artillery in the field (part of).
Seventh. Ceremonies.

With a view to insure uniformity throughout the field artillery, these regulations only shall be used for the parts of instruction covered. Regimental, battalion, and battery commanders will submit to The Adjutant-General any suggestions relative thereto which they think will add to their value.

By order of the Acting Secretary of War:

WILLIAM P. DUVALL,
Major-General, Acting Chief of Staff.

187087

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PART I.

GENERAL PRINCIPLES AND DEFINITIONS.

CHAPTER I.—GENERAL PRINCIPLES.

SECTION I.—*Instruction.*

Object of the Instruction.

1. Preparedness for war is the goal to be kept constantly in view in all peace training. No refinements of drill-ground instruction or other minor details must be allowed to obscure this definite goal or impede progress toward its attainment.

2. The special qualifications required of field artillery in war are the ability, first, to reach the position for action at the proper time and in effective condition; second, to deliver an effective and overpowering fire upon any designated part of the enemy's position.

To meet the first requirement, artillery must be prepared to cover long distances quickly, to overcome all the difficulties and obstacles of the route, and to occupy the position in a skillful manner, with men, animals, and matériel in condition for efficient service.

To meet the second requirement, artillery must be prepared to reach any part of the battlefield with effective fire, and to concentrate its fire upon any desired target.

Mobility, thorough training in fire discipline and fire direction, and extensive practice over varied country are the essential requisites of the qualifications here called for. The attainment of these qualifications is the special object of artillery instruction.

3. An additional object of instruction is to develop resourcefulness, initiative, and self-reliance on the part of artillerymen of all grades.

The regulations prescribe a method of training in the ordinary duties pertaining to the service of artillery. The personnel must be so thoroughly drilled in these duties that in the excitement of action the same may be performed readily, naturally, and as a matter of second nature.

The regulations also outline general principles according to which artillery is to be handled and fought. A guide is thus furnished as to the best way of dealing with the usual problems which arise. But every problem which arises in service has its own best solution, and this solution must be devised by the officer on the spot. His success will depend upon the extent to which he has prepared himself by previous thought and study and by previous practice in the solution of similar problems.

4. Instruction in peace must, hence, be conducted with a view, first, to drilling the personnel thoroughly in their habitual duties, and second, to affording officers and men practice and experience in dealing with the situations and difficulties apt to arise in campaign.

5. Commanding officers of field artillery should carry out such annual programmes of instruction as will prepare artillery officers for the duties of the next higher grade in time of war. Captains should be required to exercise command of battalions; and lieutenants who have completed one year's service in the field artillery, command of batteries, during a part of each annual course of instruction.

Solutions of practical problems involving at first simple tactical situations with appropriate units should be required. Practice by officers in making proper dispositions to meet the requirements and developments of tactical situations is the best training for service in war. Officers should be trained to think quickly and logically, and to assume responsibilities unhesitatingly; but errors of judgment should not be criticised harshly, as such criticism causes timidity and consequent inaction, which are generally more productive of harm than misdirected zeal.

6. It is made the duty of all field artillery commanders to see that instruction is conducted in accordance with the principles, and that the means employed are in conformity with the spirit, of the regulations; but in the application of the principles to the solution of practical problems the methods prescribed are to be taken as guides only. Great latitude should be allowed in adapting these methods to the peculiar conditions of different cases, and subordinates should be encouraged in every way possible to exercise their skill and ingenuity in solving the problems which present themselves in service.

7. Systems of instruction or of matériel can be perfected only by actual use by troops. To the end that true progress may be made, officers will be encouraged to make suggestions based upon their practical experience in regard to methods of instruction as well as in regard to the different mechanical features of the matériel. The experience of those who are most competent to judge of the merits of such systems will thus be made available for future improvements therein.

Sequence and Methods of Instruction.

8. A progressive order will be followed in all artillery instruction. The annual course of instruction should commence with the smallest unit, the section, and proceed to the larger ones in succession, culminating in the field maneuvers and firing practice of the larger units.

9. Thorough training of the individual soldier is the basis of efficiency. Great precision and attention to detail are essential in this instruction, for from it the soldier must acquire that habit of implicit obedience to orders and of accurate performance of his individual duties which is the indispensable requisite of efficiency in combined training.

10. Recruits should be assembled in small squads for the beginning of their instruction. As the instruction progresses, they will be gradually grouped according to proficiency, in order that all may advance as rapidly as their abilities permit. Those who lack aptitude and quickness will be separated from the others and placed under experienced drillmasters.

The training of the recruit will include instruction in the duties of sentinels, the care of equipments, packing knapsacks, tent pitching, pistol practice, and the customs and courtesies of the service.

11. Short and frequent drills are preferable to long ones, which exhaust the attention of both instructor and recruit.

12. The instructor of each unit is habitually its immediate chief, who should be given all due latitude in conducting the instruction and be held to strict accountability for results attained. The habit of self-reliance and a feeling of responsibility for the instruction of their respective units, as well as a proper feeling of pride therein, may thus be developed among the subdivision commanders.

The instructor will always maintain a military bearing, and by a quiet, firm demeanor set a proper example to the men. Faults should be corrected gradually, without nagging or shouting.

13. Officers and noncommissioned officers of each grade should frequently be practiced in the duties of the next higher grade.

14. Special instruction, such as tent pitching, first aid to the wounded, signaling, and gunner instruction, may appropriately be given by section or by platoon, as a healthy rivalry among the units concerned may thus be developed.

SECTION II.—*General rules.*

15. Movements that may be executed toward either flank are explained as toward but one flank, it being necessary to substitute ***left*** for ***right,*** or the reverse, to have the command and explanation of the corresponding movement toward the other flank.

16. Any movement may be executed either from the halt or when marching, unless otherwise prescribed.

17. All movements on foot not specially excepted may be executed in double time. If the movement be from the halt, or when marching in quick time, the command ***double time*** precedes the command ***march;*** if marching in double time, the command ***double time*** is omitted.

18. All mounted movements not specially excepted may be executed at the trot or gallop.

19. The gait should habitually be increased or decreased progressively, the trot being executed from the walk, and the gallop from the trot. If marching at the gallop, the gait will be decreased to the trot, then to the walk, before halting; if marching at the trot, the same rule applies, halting from the trot or gallop being considered an exceptional movement.

20. To execute a movement at the trot or gallop, the command ***trot*** or ***gallop*** precedes the command ***march,*** unless marching at the gait desired.

21. Movements or procedures explained for the smaller units are, in general, applicable to the larger ones when under instruction of the same character, the commands being modified so as to be adapted to the particular unit dealt with.

22. The intervals and distances prescribed in the text are in general such that, if marched by the flank from line, the elements will be in column at proper distances; or if marched by the flank from column, they will be in line at proper intervals. Similarly, if marching obliquely, a second oblique will place the elements in line or column, as the case may be, at proper intervals or distances. If, however, due to differences of length of elements, these conditions do not accurately obtain, the proper interval or distances are gradually secured by appropriate modifications of the gait.

23. If, in forming elements abreast of each other, the commands: 1. ***Battery*** (***Platoon,*** etc.), 2. ***HALT,*** be given during the movement, only those elements halt which have reached their new positions; the others continue the march and halt on reaching their positions.

24. For the purpose of correcting errors while marching, the instructor may command: 1. ***In place,*** 2. ***HALT;*** when all halt and stand fast. To resume the march, he commands: 1. ***Resume,*** 2. ***MARCH.***

25. To revoke a preparatory command, or, being at a halt, to begin anew a movement improperly begun, the instructor commands: ***AS YOU WERE,*** at which the movement ceases and the former position is resumed.

26. If a change of formation requires a change of post of officers and noncommissioned officers, they proceed by the shortest route to their posts in the new formation.

27. While the posts of officers and noncommissioned officers are specified in the text, as instructors they go wherever their presence is necessary.

28. Officers and noncommissioned officers who are absent are replaced ordinarily by the next lower in rank. In a battery, chiefs of platoon are replaced by the chiefs of sections of the platoon in the order of rank. The first sergeant, if performing the duties of an officer, the quartermaster and stable sergeants, and the chief mechanic are not replaced. Gunners replace absent chiefs of section; caisson corporals, absent gunners; and privates, selected for efficiency, absent caisson corporals.

29. Each unit of artillery has its permanent designation. Thus:

The First, Second, Third, Fourth, etc., Regiment of Field Artillery.

The First or Second Battalion, Third Regiment of Field Artillery.

Battery D, Sixth Field Artillery.

The first, second, third, etc., platoon of a battery.

The first, second, third, fourth, etc., section of a battery.

Units may also be referred to by their temporary relative position in line of column. Thus: The right (center or left), the leading (center or rear) regiment (battalion, battery, platoon, section, or piece). Or, if several units are involved, thus:

The right battery, left battalion.

The leading platoon, center battery.

The left section, right platoon.

The numerical designation of units does not change as their relative order in line or column is changed, with this exception: After the pieces of a battery are unlimbered and established in line, they are designated from right to left as No. 1, No. 2, No. 3, and No. 4.

SECTION III.—*Commands.*

30. Commands are of two kinds: ***Preparatory commands*** and ***commands of execution.***

The preparatory command, such as ***forward,*** indicates the movement that is to be executed.

The command of execution, such as ***MARCH, HALT,*** causes the execution.

Preparatory commands are distinguished in the text by ***italics;*** those of execution by ***CAPITALS.***

31. The commands prescribed in the text are given by the instructor, except when otherwise specified.

32. To permit of the preparatory command being understood, a well-defined pause should be made between it and the command of execution. The duration of this pause depends in a measure upon the size of the body of troops under command. Ordinarily, in dismounted movements and in mounted movements executed from a halt, the pause should be brief and of uniform duration, as otherwise uncertainty is communicated to the ranks, and a ragged execution of the movement results.

33. The tone of command is animated, distinct, and of a loudness proportioned to the number of men under command. Indifference in giving commands leads to laxity in execution.

Each preparatory command is pronounced in an ascending tone of voice, but always in such a manner that the command of execution may be more energetic and elevated.

On foot the command of execution is pronounced in a firm, brief tone.

In mounted movements, the preparatory commands are more or less prolonged to insure their being heard; the command of execution is always prolonged.

When giving commands to troops, it is usually best to face or look toward them.

34. To secure uniformity, officers and noncommissioned officers are practiced in giving commands.

35. The bugle calls and prescribed arm signals are frequently used in instruction, in order that the officers and men may readily recognize them.

CHAPTER II.—DEFINITIONS.

36. ***Alignment:*** A straight line upon which several men, teams, carriages, or bodies of troops are formed, or are to be formed.

Base: The element on which a movement is regulated, or on which a formation is made.

Center: The middle point or element of a command.

Column: A formation in which the elements are placed one behind another.

Depth: The space from head to rear of any formation, including the leading and rear elements.

Disposition: The arrangement of the elements in a formation.

Distance: Open space between elements in the direction of depth.

Element: One of the similar parts of a larger unit—as a file, gun squad, team, carriage, section, platoon, battery, etc.

Facing distance: The difference between the front of a man in ranks, including his interval, and his depth—about fourteen inches.

File: Two men—the front-rank man and the corresponding man of the rear rank. The front-rank man is the ***file leader.***

A file which has no rear-rank man is a ***blank file.*** The term ***files*** applies also to individual men in single-rank formation. A single mounted man in ranks is also called a file.

File closers: The officers, noncommissioned officers, and men acting as such, who, in dismounted formations, are posted one yard in rear of the rear rank in line.

Fire direction: The tactical direction of one or more fire units with a view to bringing their fire to bear at the right place and the right time.

Fire discipline: That condition resulting from training and practice which insures an orderly and efficient working of the personnel in the delivery of fire.

Flank: The right or left of a command in line or column; also the element on the right or left of a line.

By the enemy's ***right*** (***left***) ***flank*** is meant the flank which the enemy himself would so designate.

Formation: Arrangement of the elements of a command in their order in line, in column, or for battle.

Front: The space in width occupied by a command either in line or column. The term ***front*** is also used to denote the direction in which the elements of a command face, as well as to denote the direction of the enemy.

The ***front*** of a gun unlimbered is the direction in which the muzzle points; of a limber or of a carriage limbered, the direction in which the pole points.

Guide: An officer, noncommissioned officer, or private upon whom a command or an element thereof regulates its march.

Interval: Open space between elements abreast of each other.

Laying: The process of pointing a gun for range and direction, so as to cause the trajectory to pass through the target.

Left: The left extremity or element of a body of troops.

Line: A formation in which the different elements are abreast of each other. When the elements are in column, the formation is called a ***line of columns.***

Maneuver: A movement executed by a battery or larger unit for the purpose of changing from one formation to another.

Rafale: A burst of fire delivered with great rapidity with a view to searching promptly a certain locality.

The discharge of the complete number of rounds called for in a single execution of *zone fire* constitutes a rafale. Likewise, a volley at a single range or volleys at successive ranges may be termed a rafale.

Rank: A line of men, horses, teams, or carriages, abreast of each other.

Right: The right extremity or element of a body of troops.

Salvo: A single discharge from each of the guns of a battery or other unit, fired in regular order from one flank to the other, with intervals of about three seconds.

Volley: The rapid discharge of a certain indicated number of rounds, by each gun of a battery or other unit, each gun firing without regard to the others.

PART II.

DISMOUNTED INSTRUCTION.

CHAPTER I.—GENERAL RULES.

37. Formations are habitually in double rank; the men always fall in at attention.

38. The interval between men in ranks is four inches and between ranks in flank column is twenty-six inches, measured from elbow to elbow. The distance between ranks and between files in flank column is one yard, measured from the back of the man in front to the breast of the man in rear.

The allowance for the front of a man is taken at about twenty-six inches, including the interval; the depth, about twelve inches.

Distance between subdivisions in column is measured from guide to guide.

39. To secure uniformity of interval between files when falling in and in the alignments, each man places the palm of the left hand upon the hip, fingers pointing downward. In falling in, the hand is dropped by the side as soon as the man next on the left has his interval; in the alignments, at the command ***front***.

40. When marching in flank column, the leading man of the front rank is, without indication, the guide of the column.

During the oblique march, the leading man of the leading rank is, without indication, the guide.

When marching in line, the front-rank man on the designated flank is the guide; in column of subdivisions, the leading guide is the guide of the column; in line of subdivision columns, the guide of the subdivision on the designated flank is the guide of the line.

41. When marching in line, in column of subdivisions, or in line of subdivision columns, the guide is always announced as soon as the march is begun, or as soon as the line or column is formed. On marching to the rear from line, or on taking the full step after a turn, the guide is announced as soon as the march in the new direction is begun. For example—

Being in line at a halt:

1. ***Forward,*** 2. ***MARCH,*** 3. ***Guide*** (***right*** or ***left***).

Being in line:

1. ***Sections right,*** 2. ***MARCH,*** 3. ***Full step,*** 4. ***MARCH,*** 5. ***Guide*** (***right*** or ***left***).

Being in flank column:

1. ***Sections column right*** (***left***), 2. ***MARCH,*** 3. ***Guide*** (***right*** or ***left***).

Marching in line:

1. ***To the rear,*** 2. ***MARCH,*** 3. ***Guide*** (***right*** or ***left***); or,

1. ***Right turn,*** 2. ***MARCH,*** 3. ***Full step,*** 4. ***MARCH,*** 5. ***Guide*** (***right*** or ***left***).

CHAPTER II.—THE SOLDIER DISMOUNTED.

SECTION I.—*General provisions.*

42. This instruction has for its object the training of the individual recruit and afterwards that of the squad. It must be given with the greatest attention to detail.

43. In the instruction of the recruit, frequent short rests should be given, in order that the men may not be unduly fatigued.

The instructor will take advantage of these rests to instruct the recruits in the customs and courtesies of the service, the duties of orderlies, the proper manner of receiving messages from and delivering them to officers, etc., so that when the recruit is finally reported for duty he will not only know his prescribed drill thoroughly, but will know how to conduct himself out of ranks as a trained soldier.

44. From the beginning the instructor will insist on a smart appearance of the recruits, and will require that their clothing be clean and neatly adjusted.

45. The instructor briefly explains each movement, at first executing it himself if necessary. He exacts by degrees the desired precision and uniformity.

SECTION II.—*The recruit.*

46. For the individual instruction, a few recruits, usually not exceeding four, are placed in a single rank, facing to the front and about four inches apart.

They execute the marchings as explained for a squad.

Position of the Soldier, or Attention.

47. Heels on the same line and as near each other as the conformation of the man permits.

Feet turned out equally and forming with each other an angle of about sixty degrees.

Knees straight without stiffness.

Body erect on the hips, inclined a little forward; shoulders square and falling equally.

Arms and hands hanging naturally, backs of the hands outward; little fingers opposite the seams of the trousers; elbows near the body.

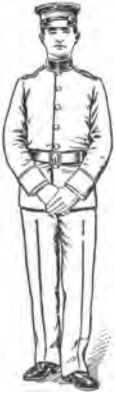
Head erect and square to the front, chin slightly drawn in without constraint, eyes straight to the front.

To Assemble.

48. To teach the recruits to assemble, the instructor requires them to place the palm of the left hand upon the hip, below the belt when worn; he then places them on the same line so that the right arm of each man rests lightly against the elbow of the man next on his right, and then directs the left hand to be replaced by the side.

When the recruits have learned how to take their places, the instructor commands: ***FALL IN.***

They assemble rapidly as above prescribed, each man dropping the left hand as soon as the man next on his left has his interval.



Pl. 1, Par. 49.

The Rests.

49. Being at a halt, the commands are: ***FALL OUT; REST; AT EASE;*** and, 1. ***Parade,*** 2. ***REST.***

At the command ***fall out,*** the men leave the ranks, but remain in the immediate vicinity. At the command ***fall in,*** they resume their former places.

At the command ***rest,*** each man keeps one foot in place, but is not required to preserve silence or immobility.

At the command ***at ease,*** each man keeps one foot in place and preserves silence, but not immobility.

1. ***Parade,*** 2. ***REST.*** Carry the right foot six inches straight to the rear, left knee slightly bent; clasp the hands, without constraint, in front of the center of the

body, fingers joined, left hand uppermost, left thumb clasped by thumb and forefinger of right hand; preserve silence and steadiness of position.

50. To resume the attention: 1. ***Squad,*** 2. ***ATTENTION.***

The men take the position of the soldier and fix their attention.

To Dismiss the Recruits.

51. Being in line at a halt: ***DISMISSED.***

Eyes Right or Left.

52. 1. ***Eyes,*** 2. ***RIGHT*** (***LEFT***), 3. ***FRONT.***

At the command ***right,*** turn the head to the right so as to bring the left eye in a line about two inches to the right of the center of the body, eyes fixed on the line of eyes of the men in, or supposed to be in, the same rank.

At the command ***front,*** turn the head and eyes to the front.

Facings.

53. To the flank: 1. ***Right*** (***Left***), 2. ***FACE.***

Raise slightly the left heel and right toe, face to the right, turning on the right heel, assisted by a slight pressure on the ball of the left foot; place the left foot by the side of the right. Left face is executed on the left heel.

To face in marching and advance, turn on the ball of the foot in advance and step off with the other foot in the new line of direction; to face in marching without gaining ground in the new direction, turn on the ball of the foot in advance and mark time.

To the rear: 1. ***About,*** 2. ***FACE.***

Raise slightly the left heel and right toe, face to the rear, turning to the right on the right heel and the ball of the left foot; replace the left foot by the side of the right.

Officers execute the about face as follows:

At the command ***about,*** carry the toe of the right foot about eight inches to the rear and three inches to the left of the left heel without changing the position of the left foot.

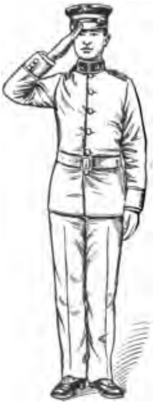
At the command ***face,*** face to the rear, turning to the right on the left heel and right toe; replace the right heel by the side of the left.

Enlisted men out of ranks may use the about face prescribed for officers.

Salute With the Hand.

54. 1. ***Right*** (***Left***) ***hand,*** 2. ***SALUTE.***

Raise the right hand smartly till the tip of forefinger touches the lower part of headdress (if uncovered, the forehead) above the right eye, thumb and fingers extended and joined, palm to the left, forearm inclined at about forty-five degrees, hand and wrist straight. ***TWO.*** Drop the arm smartly by the side.



Pl. 2, Par. 54.

The salute for officers is the same; the left hand is used only when the right is engaged. Officers and men, when saluting, look toward the person saluted.

Setting-up Exercises.

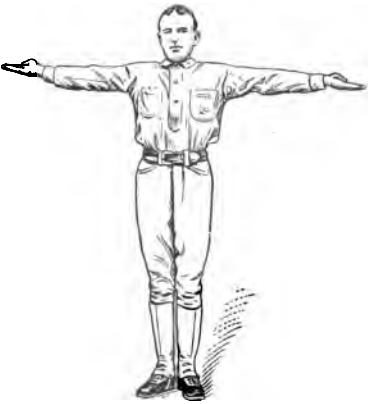
55. All soldiers are regularly practiced in the following exercises, which may be supplemented by those in authorized calisthenic manuals.

The instructor places the men about two yards apart.

In these exercises it is advisable to remove coats and caps.

As a rule, the instructor will not keep the men in a constrained position longer than is necessary to give the next command; and while giving any extended explanation, he will keep the men at ease.

As soon as the exercises are well understood, they may be continued without repeating the commands. For this purpose the instructor gives the commands as prescribed, then adds: ***Continue the exercise;*** upon which the motions to be repeated are continuously executed until the command ***halt.***



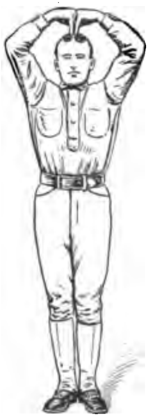
Pl. 3, Par. 55, 1 Ex.

At the command *halt*, given at any time, the position of the soldier is resumed.

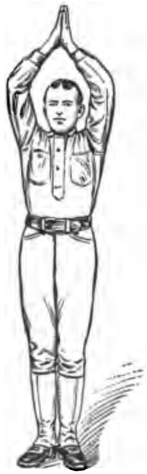
First Exercise.

1. ***Arm***, 2. ***EXERCISE***, 3. ***HEAD***, 4. ***UP***, 5. ***DOWN***, 6. ***RAISE***.

At the command *exercise*, raise the arms laterally until horizontal, palms upward. ***HEAD:*** Raise the arms in a circular direction over the head, tips of fingers touching top of the head, backs of fingers in contact their full length, thumbs pointing to the rear, elbows pressed back. ***UP:*** Extend the arms upward their full length, palms touching. ***DOWN:*** Force the arms obliquely back and gradually let them fall by the sides. ***RAISE:*** Raise the arms laterally, as prescribed for the second command. Continue by repeating ***head, up, down, raise.***



Pl. 4, Par. 55, 1 Ex.

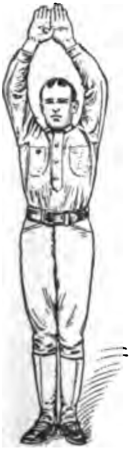


Pl. 4, Par. 55, 1 Ex.

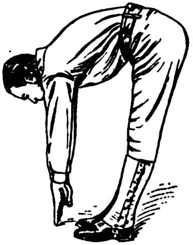
Second Exercise.

1. ***Arms vertical, palms to the front***, 2. ***RAISE***, 3. ***DOWN***, 4. ***UP***.

At the command *raise*, raise the arms laterally from the sides, extended to their full length, till the hands meet above the head, palms to the front, fingers pointing upward, thumbs locked, right thumb in front, shoulders pressed back. ***DOWN:*** Bend over till the hands, if possible, touch the ground, keeping the arms and knees straight. ***UP:*** Straighten the body and swing the ex-



Pl. 6, Par. 55, 2 Ex.



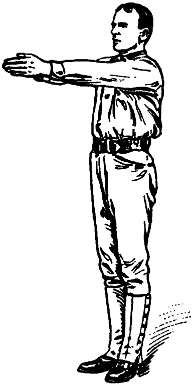
Pl. 7, Par. 55, 2 Ex.

tended arms, thumbs locked, to the vertical position. Continue by repeating ***down, up.***

Third Exercise.

1. ***Arm,*** 2. ***EXERCISE,*** 3. ***FRONT,*** 4. ***REAR.***

At the command ***exercise,*** raise the arms laterally until horizontal, palms upward. ***FRONT:*** Swing the extended arms horizontally to the front, palms touching. ***REAR:*** Swing the extended arms well to the rear, inclining them slightly downward, raising the body upon the toes. Continue by repeating ***front, rear,*** till the men, if possible, are able to touch the backs of the hands behind the back.



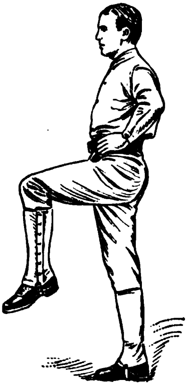
Pl. 8, Par. 55, 3 Ex.

Fourth Exercise.

1. ***Leg.*** 2. ***EXERCISE,*** 3. ***UP.***

At the command ***exercise,*** place the palms of the hands on the hips, fingers to the front, thumbs to the rear, elbows pressed back. ***UP:*** Raise the left leg to the front, bending and elevating the knee as much as possible, leg from knee to instep vertical, toe depressed. ***UP:*** Replace the left foot and raise the right leg as prescribed for the left.

Execute slowly at first, then gradually increase to the cadence of double time. Continue by repeating ***up*** when the right and left legs are alternately in position.



Pl. 9, Par. 55, 4 Ex.

Fifth Exercise.

1. ***Leg,*** 2. ***EXERCISE,*** 3. ***Left*** (***Right***), 4. ***FORWARD,*** 5. ***REAR;*** or, 5 ***GROUND.***

At the command ***exercise,*** place the hands on the hips, as in Fourth Exercise. ***FORWARD:*** Move the left leg to the front, knee straight, so as to advance the foot about fifteen inches, toe turned out, sole nearly horizontal, body balanced on right foot. ***REAR:*** Move the leg to the rear, knee straight, toe on a line with the right heel, sole nearly horizontal. Continue by repeating ***forward, rear.***

When the recruit has learned to balance himself, the command ***forward*** is followed by ***GROUND:*** Throw the weight of the body forward by rising on the ball of the right foot, advance and plant the left, left heel thirty inches from the right, and advance the right leg quickly to the position of ***forward.*** Continue by repeating ***ground*** when the right and left legs are alternately in the position of ***forward.***

Sixth Exercise.

1. ***Lung,*** 2. ***EXERCISE,*** 3. ***INHALE,*** 4. ***EXHALE.***

At the command ***exercise,*** place the hands on the hips as in Fourth Exercise. ***INHALE:*** Inflate the lungs to full capacity by short, successive inhalations through the nose. ***EXHALE:*** Empty the lungs by a continuous exhalation through the mouth. Continue by repeating ***inhale, exhale.***

STEPS AND MARCHINGS.

Quick Time.

56. The length of the full step in quick time is thirty inches, measured from heel to heel, and the cadence is at the rate of one hundred and twenty steps per minute.

57. To march in quick time: 1. ***Forward,*** 2. ***MARCH.***

At the command ***forward,*** throw the weight of the body upon the right leg, left knee straight.

At the command ***march,*** move the left foot smartly, but without jerk, straight forward thirty inches from the right, measuring from heel to heel, sole near the ground; straighten and turn the knee slightly out; at the same time throw the weight of the body forward, and plant the foot without shock, weight of body resting upon it; next, in like manner, advance the right foot and plant it as above; continue the march.

The cadence is at first given slowly, and gradually increased to that of quick time.

The arms swing naturally, the hands moving about six inches to the front, and three inches to the rear of the seam of the trousers.

58. The instructor, when necessary, indicates the cadence of the step by calling *one, two, three, four;* or, *left, right,* the instant the left and right foot, respectively, should be planted.

Double Time.

59. The length of the full step in double time is thirty-six inches; the cadence is at the rate of one hundred and eighty steps per minute.

60. To march in double time: 1. *Forward,* 2. *Double time,* 3. ***MARCH.***

At the command *forward,* throw the weight of the body on the right leg.

At the command *march,* raise the hands until the forearms are horizontal, fingers closed, nails toward the body, elbows to the rear; carry forward the left foot, knee slightly bent and somewhat raised, and plant the foot thirty-six inches from the right; then execute the same motion with the right foot; continue this alternate movement of the feet, throwing the weight of the body forward, and allowing a natural swinging motion of the arms.

If marching in quick time, the command *forward* is omitted. At the command *march,* given as either foot strikes the ground, take one step in quick, and then step off in double time.

To resume the quick time: 1. *Quick time,* 2. ***MARCH.***

At the command *march,* given as either foot strikes the ground, advance and plant the other foot in double time, resume the quick time, dropping the hands by the sides.

Recruits are also exercised in running, the principles being the same as for double time.

When marching in double time and in running, the men breathe as much as possible through the nose, keeping the mouth closed.

Distances of one hundred, and one hundred and eighty yards are marked on the drill ground, and noncommissioned officers and men practiced in keeping correct cadence and length of pace in both quick and double time.

To Halt.

61. To arrest the march in quick or double time: 1. ***Squad,*** 2. ***HALT.***

At the command ***halt,*** given as either foot strikes the ground, advance and plant the other foot; place the foot in rear by the side of the other. If in double time, drop the hands by the sides.

The ***halt,*** while ***marking time,*** and marching at the ***half step, side step,*** and ***back step,*** is executed by the same commands.

To Mark Time.

62. Being in march: 1. ***Mark time,*** 2. ***MARCH.***

At the command ***march,*** given as either foot strikes the ground, advance and plant the other foot; bring up the foot in rear, and continue the cadence by alternately raising and planting each foot on line with the other. The feet are raised about four inches from the ground and planted with the same energy as when advancing.

To resume the full step: 1. ***Full step,*** 2. ***MARCH.***

Half Step.

63. Being in march: 1. ***Half step,*** 2. ***MARCH.***

At the command ***march,*** given as either foot strikes the ground, take steps of fifteen inches.

To resume the full step: 1. ***Full step,*** 2. ***MARCH.***

The length of the half step in double time is eighteen inches.

Side Step.

64. Being at a halt: 1. ***Right*** (***Left***) ***step,*** 2. ***MARCH.***

Carry and plant the right foot ten inches to the right; bring the left foot beside it and continue the movement in cadence of quick time.

The side step is used for short distances only and is not executed in double time.

Back Step.

65. Being at a halt: 1. ***Backward,*** 2. ***MARCH.***

At the command ***march,*** step back with the left foot fifteen inches straight to the rear, then with the right, and so on, the feet alternating.

At the command *halt,* bring back the foot in front to the side of the one in rear.

The back step is used for short distances only, and is not executed in double time.

Change Step.

66. Being in march: 1. *Change step,* 2. *MARCH.*

At the command *march,* given as the right foot strikes the ground, advance and plant the left foot; plant the toe of the right foot near the heel of the left and step off with the left foot.

The change on the right foot is similarly executed, the command *march* being given as the left foot strikes the ground.

To March to the Rear.

67. Being in march: 1. *To the rear,* 2. *MARCH.*

At the command *march,* given as the right foot strikes the ground, advance and plant the left foot; then, turning on the balls of both feet, face to the right about and immediately step off with the left foot.

If marching in double time, turn to the right about, taking four steps in place, keeping the cadence, and then step off with the left foot.

To March by the Flank.

68. Being in march: 1. *By the right (left) flank,* 2. *MARCH.*

At the command *march,* given as the right foot strikes the ground, advance and plant the left foot, then face to the right in marching and step off in the new direction with the right foot.

Covering and Marching on Points.

69. It should be demonstrated to the recruits that they can not march in a straight line without selecting two points in the desired direction and keeping them covered while advancing.

The instructor indicates two points and requires the recruits in succession to place themselves upon the prolongation of the straight line through these points and then to march upon them in both quick and double time.

A distant and conspicuous landmark is then indicated as a point of direction; the recruit is required to select an intermediate point in line with the point of direction and to march on this line, selecting new points as he advances.

SECTION III.—*The squad.*

70. As soon as the recruits are sufficiently instructed for the purpose, they are formed into squads of convenient size in order to teach them the principles of the alignments, taking intervals, the marchings, and the turnings.

71. For this instruction, the recruits are formed in double rank. The files on the right and left of the squad are always complete; if there be an incomplete file, it will be the second from the left. The rear-rank men cover their file leaders accurately at one yard distance.

In the case of a small number of recruits, they may be formed in single rank. The movements described for the double rank formation apply equally well to the single rank, omitting the explanations for the rear-rank men.

To Form the Squad.

72. To form the squad, the instructor designates a recruit as the front-rank man of the right file and indicates to him where the right of the squad is to rest; he then places himself about three yards in front of where the center is to be formed, and commands: ***FALL IN.***

The men form on the designated recruit, in two ranks facing to the front, as already prescribed (par. 48).

73. The squad executes ***the rests;*** resumes ***the attention; marks time;*** and executes ***the facings, the setting-up exercises, the steps,*** and ***the halt,*** and is dismissed by the same commands and means as explained for the recruti.

Alignments.

74. The alignments are first taught by requiring the recruits to align themselves upon two files established as a base.

Being at a halt, the instructor causes the first two files on the flank toward which the alignment is to be made to move forward a few paces, and establishes them as a base; he then commands: 1. ***Right*** (***Left***), 2. ***DRESS,*** 3. ***FRONT.***

At the command ***dress,*** the first two files execute ***eyes right,*** and place the left hand upon the hip. The remaining files march to the front, each man shortening the last step so as to place himself about six inches in rear of the new alignment, which should never be passed; each man then executes ***eyes right,*** places the left hand upon the hip, whether dressing to the right or left, and taking steps of two or three inches moves up and places his right arm lightly against the elbow of the man on his right, so that his eyes and shoulders are in line with those of the men on his right.

The instructor verifies the alignment of both ranks from the right flank and orders up or back such men as may be in rear or in advance of the line; only the men designated move.

At the command ***front,*** given when the ranks are aligned, each man turns his head and eyes to the front and drops his left hand by the side.

75. At first, the basis of the alignment is established parallel to the front of the squad; afterwards, in oblique directions.

76. The recruits having learned to align themselves, the instructor establishes the base file and commands: 1. ***Right*** (***Left***), 2. ***DRESS,*** 3. ***FRONT.***

At the command ***dress,*** the men, except the base file, move forward and all dress as previously explained, the rear-rank men being careful to cover their file leaders accurately.

77. Alignments to the rear are executed on the same principles; 1. ***Right*** (***Left***), ***backward,*** 2. ***DRESS,*** 3. ***FRONT.***

The men step back, halt a little in rear of the line, and immediately dress up as previously explained.

78. To execute the alignments, using the side step, the instructor establishes the base file a short distance to the right or left of the squad, and commands: 1. ***Right*** (***Left***) ***step,*** 2. (***Right*** or ***Left***), 3. ***DRESS,*** 4. ***FRONT.***

At the command ***dress,*** the men execute the side step, close toward the base file, and dress as previously explained.

To Take Intervals.

79. Being in line at a halt: 1. ***To the right*** (***left***) ***take intervals,*** 2. ***MARCH,*** 3. ***Squad,*** 4. ***HALT.***

At the first command, the rear rank steps back to two yards distance from the front rank; at the command ***march,*** all face to the right and the leading man of each rank steps off; the other men step off in succession so as to follow the preceding man at two yards.

At the command ***halt,*** given when all have their intervals, all halt and face to the front.

To Assemble.

80. 1. ***To the right** (**left**) **assemble,*** 2. ***MARCH.***

The front-rank man on the right stands fast, the rear-rank man on the right closes to one yard. The other men face to the right, close by the shortest line, and face to the front.

MARCHINGS.

81. During the marchings the guide conducts the march, preserving with great care the direction and the length and cadence of the step, selecting points on which to march, as explained in paragraph 69.

To March to the Front.

82. Being at a halt: 1. ***Forward,*** 2. ***MARCH.***

The men step off and march straight to the front.

If in line, the rear-rank men follow their file leaders accurately. The instructor sees that the ranks preserve the alignment and the intervals toward the side of the guide. The men yield to pressure from that side and resist pressure from the opposite side; by slightly shortening or lengthening the step they gradually recover the alignment, and by slightly opening out or closing in they gradually recover the interval, if lost; while habitually keeping the head to the front, they may occasionally glance toward the side of the guide to assure themselves of the alignment and interval, but the head is turned as little as possible for this purpose.

If in flank column, the men of the leading file step off at full step; the leading rear-rank man marches abreast of his file leader at twenty-six inches interval. The other files march at the half step, each taking the full step when at one yard distance.

To March to the Rear.

83. Being in march: 1. ***To the rear,*** 2. ***MARCH.***

Executed as explained in paragraph 67.

If at a halt, the squad may be faced about and then moved forward, as explained in the preceding paragraph; or, without facing about, it may be marched a short distance to the rear, as explained in paragraph 65, by the command: 1. ***Backward,*** 2. ***MARCH.***

Whenever the squad in line is faced about or marched to the rear, all men in the front rank not covered, step into the new front rank.

To March by the Flank.

84. Being in line: 1. ***By the right*** (***left***) ***flank,*** 2. ***MARCH.***

Executed as explained in paragraphs 68 and 82.

The formation obtained by marching by the flank from line is called a ***flank column.***

If at a halt, the squad may be marched by the flank by first facing it in the desired direction and then moving it forward, as explained in paragraph 82.

When the march by the flank is executed from flank column while at one yard distance, the files close in gradually toward the guide until they have the prescribed interval.

85. Whenever the flank column is halted while marching at one yard distance, the leading file halts at the command; the others close to facing distance before halting.

86. To close up in flank column without halting: 1. ***Close.*** 2. ***MARCH.***

The leading file takes the half step; the other files close to facing distance and take the half step; all the files having closed to facing distance, the column is halted or marched by the flank as previously explained.

87. To halt the flank column without closing up: 1. ***In place,*** 2. ***HALT.***

To March Obliquely.

88. For the instruction of recruits, the squad being correctly aligned, the instructor causes the squad to face half right or half left, points out to the men their relative positions and explains that these are to be maintained in the oblique march.

89. 1. ***Right*** (***Left***) ***oblique,*** 2. ***MARCH.***

Each man steps off in a direction forty-five degrees to the right of his former front. He preserves his relative position, keeping his shoulders parallel to those of the guide, and so regulates his step as to keep the ranks parallel to their original direction.

If the command ***halt*** be given while marching obliquely, the men halt faced in the direction in which they are marching.

To resume the oblique march: 1. ***Forward,*** 2. ***MARCH.***

At *half step* or *mark time,* while obliquing, the oblique march is resumed by the commands: 1. *Full step,* 2. ***MARCH.***

90. While obliquing, to execute a second oblique in either direction: 1. *Right* (*Left*) *oblique,* 2. ***MARCH.***

If line be formed, the files, if not at proper intervals, close in gradually toward the guide; similarly, if flank column be formed, the files, if not at one yard distance, fall back as prescribed in paragraph 82.

To Change Direction in Flank Column.

91. 1. *Column right* (*left*), 2. ***MARCH.***

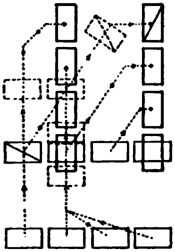
The pivot man of the leading file faces to the right in marching and takes the half step; the man on the marching flank, by twice obliquing to the right, places himself abreast of the pivot man; the latter then takes the full step. The other files march squarely up to the turning point and execute the change of direction on the same ground and in the same manner. When executed from a halt, all the men step off at the command *march.*

TURNINGS.

To Turn on Fixed Pivot.

92. Being in line: 1. *Squad right* (*left*), 2. ***MARCH,*** 3. *Squad,* 4. ***HALT;*** or, 3. *Full step,* 4. ***MARCH.***

At the second command, the pivot man marks time, turning to the right in his place; the other front-rank men, by twice obliquing to the right, place themselves abreast of the pivot man and mark time. The rear rank does not turn as a rank; the men conform to the movement of the front rank, place themselves covering their file leaders at a distance of one yard and mark time. The fourth command is given when the last man arrives in his new position.



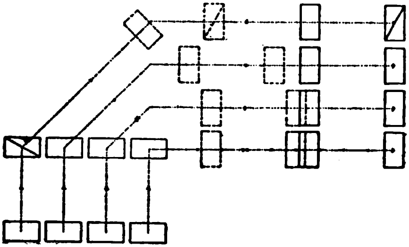
Pl. 10, Par. 92.

The *turn on fixed pivot* is used in all formations from line into column and the reverse.

To Turn on Moving Pivot.

93. Marching in line: 1. ***Right*** (***Left***) ***turn,*** 2. ***MARCH,*** 3. ***Full step,*** 4. ***MARCH.***

At the second command, the pivot man, who is the guide during the movement, faces to the right in marching and takes the half step; the other front-rank men, by twice obliquing to the right, place themselves abreast of the pivot man and take the half step. The rear rank advances and turns on the same ground and in the same manner as the front rank, maintaining the distance of one yard. All take the full step at the fourth command, which is given when the last man arrives in his new position.



Pl. 11, Par. 93.

The movement is similarly executed from a halt. At the second command, the pivot man faces to the right as in marching and steps off at half step.

Right (***Left***) ***half turn*** is executed in a similar manner. The pivot man makes a half change of direction to the right and the other men make quarter changes in obliquing.

The ***turn on moving pivot*** is used by subdivisions of a column in executing changes of direction.

94. The exercises of a ***gun squad dismounted*** and of a ***section dismounted*** are similarly executed, substituting in the latter case the word ***section*** for ***squad*** in the commands.

SECTION. IV.—*Manual of the pistol.*

95. The instruction under this head is first given on foot.

When a lanyard is used, one end is attached to the butt of the pistol; the other end forms a sliding loop, which is passed over the head and drawn snug against the right armpit. The lanyard should then be of just such length that the arm can be extended without constraint.

96. The pistol being in the holster, to raise pistol: 1. ***Raise,*** 2. ***PISTOL.***

At the command ***raise,*** unbutton the holster flap with the right hand and grasp the stock, back of the hand to the body.

At the command ***pistol,*** draw the pistol from the holster, reverse it, muzzle up, the hand holding the stock with the thumb and last three fingers; the little finger may be placed under the butt; forefinger outside of the guard; guard to the front; barrel nearly vertical; hand as high as the neck and six inches to the right and front of the right shoulder. This is the position of ***raise pistol.***

When dismounted, carry the right foot about twenty inches to the right and place the left hand in the position of the bridle hand.

97. Being at raise pistol: 1. ***Return,*** 2. ***PISTOL.***

Insert the pistol in the holster, back of hand to the body, button the flap, and drop the hand by the side.

If dismounted, bring the right foot by the side of the left and drop the left hand by the side.

If the holster is so constructed that the butt is to the rear, raise and return pistol are executed as already prescribed, except that the back of the hand is to the right and the pistol is not reversed.

98. 1. ***Inspection,*** 2. ***PISTOL.***

Execute raise pistol, except that the pistol is held about six inches in front of the center of the body, barrel up, pointing to the left front and upward at an angle of about forty-five degrees, wrist straight and as high as the breast.

The instructor passes along the rank and examines the pistols. To inspect the pistol minutely, he takes it in his hands and then returns it to the soldier, who grasps it at the stock and resumes ***inspection pistol;*** each man returns pistol as the inspector passes to the next. If the pistols are not inspected, they are returned by the commands: 1. ***Return,*** 2. ***PISTOL.***

When dismounted, the left hand and right foot remain in place.

For purposes of instruction the men may be required to execute ***inspection pistol*** simultaneously, suitable caution being given to that effect by the instructor. But at formal inspections the men execute ***inspection pistol*** in succession as the inspector approaches them.

99. Being at raise pistol: ***LOAD.***

Place the pistol at the cylinder in the left hand, latch up, barrel inclined to the left front and downward at an angle of about thirty degrees; draw back the latch with the right thumb, push the cylinder out with the second finger of the left hand, and, if necessary, eject the empty shells by pressing the ejector with the left thumb, right hand steadying the pistol at the stock; take a cartridge from the belt or box, insert it in the chamber, press it home with the right thumb, and so on for each chamber to be loaded; close the cylinder with the left thumb so that the hammer will rest over the empty chamber and raise pistol.

Firings.

100. For single action. Being at raise pistol: 1. ***To the front*** (***right oblique,*** etc.); or, 1. ***At*** (such an object), 2. ***READY.***

Cock the pistol with the right thumb and direct the eyes to the front or toward the target.

101. 1. ***Squad,*** 2. ***FIRE.***

Thrust and point the pistol to the front or toward the target, arm nearly or quite extended, keeping the eyes on the object, and fire; resume the raise pistol.

To continue the firing in the same direction, or at the same target: 1. ***READY,*** 2. ***Squad,*** 3. ***FIRE.***

102. For double action. Being at raise pistol: 1. ***To the front*** (***right oblique,*** etc.), 2. ***Squad,*** 3. ***FIRE;*** or, 1. ***At*** (such an object), 2. ***Squad,*** 3. ***FIRE.***

Executed as in paragraph 101, except that at the command ***fire,*** the pistol is cocked by pressing steadily on the trigger.

103. An almost imperceptible pause may be allowed between the thrusting and firing, in which to correctly point the pistol. Deliberate aiming, however, should not be encouraged. After firing without cartridges, pause an instant to see if the pistol is correctly pointed, to get the personal error.

The instructor must take into account individual peculiarities in order to secure the best results in firing; in such cases departure from the text is permissible.

When mounted, lean slightly forward, bearing on the stirrups; in firing to the front, lean well to the right and slightly forward, to avoid burning or frightening the horse.

104. In a similar manner, the men will be instructed to fire to the left, right oblique, left oblique, right rear, left rear, and rear. When firing to the left, the pistol hand will be about opposite the left shoulder; when firing to the rear or right rear, the shoulders are turned about forty-five degrees to the right; when firing to the left and left rear, the shoulders are turned about forty-five degrees to the left.

105. The recruits are first taught the motions of loading and firing without using cartridges. Loading and pointing practice will be given at all gaits when mounted.

106. No cartridges will be used, except when indicated in the first command, thus: 1. ***With*** (so many) ***dummy*** (***blank*** or ***ball***) ***cartridges***, 2. ***LOAD.***

107. To fire at will: 1. ***Fire at will***, 2. ***To the front***, etc.; or, 2. ***At*** (such an object), 3. ***COMMENCE FIRING***, 4. ***CEASE FIRING.***

The soldier fires as rapidly as is consistent with careful pointing at each shot. The raise pistol is resumed after each shot.

At the command ***cease firing***, the firing will stop, and the men resume the raise pistol.

108. At dismounted practice, instead of taking the position of ***raise pistol*** after each shot, the men may be permitted to ***lower*** the pistol, and to fire from this position. In this case the pistol is lowered without changing the grasp of the hand, the arm by the side and nearly extended, back of the hand to the right; barrel inclined to the front and downward.

109. Target practice will be conducted on the principles explained in the Small-Arms Firing Regulations.

CHAPTER III.—THE BATTERY DISMOUNTED.

SECTION I.—*General provisions.*

110. The instruction prescribed for the Battery Dismounted is applicable, with obvious modifications, to the Platoon Dismounted, the Section Dismounted, and the Gun Squad Dismounted. It is likewise applicable to the exercises of several ***gun squads dismounted.***

111. A ***section dismounted*** comprises all the men assigned to the service of a single piece and its caisson, or of two caissons. It consists of one sergeant, who is chief of section; two corporals; the cannoneers; the drivers of the carriages; and such mechanics, cooks, musicians, and reserve drivers and cannoneers as may be assigned to it for convenience of administration.

The men are permanently assigned to sections, and are transferred by order of the captain only; they may be temporarily attached to sections not their own, to equalize subdivisions at drill or other duty.

A section assigned to the service of a piece and its caisson is called a ***gun section;*** a section assigned to the service of two caissons is called a ***caisson section.***

112. A ***platoon dismounted*** consists of one lieutenant, who is chief of platoon, and two sections dismounted.

113. A ***battery dismounted*** comprises, on a peace footing, three platoons; on a war footing, four platoons.

114. The guides of a battery are the gunner and caisson corporal, posted on its right and left.

The guides of a section or of a gun squad are the gunner and the front rank man on the opposite flank.

115. Chiefs of platoon and section supervise the movements of their platoons and sections, but repeat or give commands only when prescribed.

116. ***File closers*** will rectify mistakes and insure steadiness and promptness in the ranks.

117. The battery is formed in double rank with the platoons and sections arranged from right to left in the order of their permanent numbers.

The senior lieutenant is assigned as chief of the first platoon, the lieutenant next in rank as chief of the second platoon, and so on.

The first four sections are ***gun sections;*** the others are ***caisson sections.*** The senior corporal in a gun section is the ***gunner,*** the junior corporal is the ***caisson corporal;*** in a caisson section the senior caisson corporal corresponds to the gunner in the gun section and has the same post in ranks.

SECTION II.—*Posts of officers, noncommissioned officers, etc.*

In Line.

118. The captain: Four yards in front of the center of the battery.

Chiefs of platoon: Two yards in front of the center of their platoons.

The fourth lieutenant, when there are but three platoons: In the line of file closers, opposite the center of the battery.

The first sergeant: In the front rank, one yard from the right of the first section.

The quartermaster and stable sergeants: In the front rank, one yard from the left of the left section, in order of rank from right to left.

Chiefs of section: One yard in front of the center of their sections.

Gunners: On the right of the front rank of their sections, not covered in the rear rank.

Caisson corporals: In the line of file-closers, one yard in rear of the left file of their sections, except the caisson corporal of the left section, who is on the left of the front rank of his section, not covered in the rear rank.

The guidon: On the left of the front rank of the right center section, not covered in the rear rank.

The musicians: In the line of file closers in rear of the first section.

In Subdivision Column.

119. The captain: Four yards from the flank, opposite the center, on the left (right) when the right (left) is in front.

Chiefs of platoon: In platoon column, two yards in front of the center of their platoons; in section column, on the same side as the post prescribed for the captain, two yards from the flank, opposite the center of their platoons.

The fourth lieutenant, when there are but three platoons: On the side opposite the captain, two yards from the flank and opposite the center of the column.

The first sergeant: On the same side as the captain, aligned on the front rank of the nearest subdivision and one yard from it.

The quartermaster and stable sergeants: They turn to the side indicated, and are either four yards in front of the center of the leading subdivision or four yards in rear of the last subdivision, according as the column has been formed toward their flank of the battery or the flank opposite.

Chiefs of section, gunners, caisson corporals, guidon, and musicians: Same as in line, except that of the caisson corporal of the left section, who takes post one yard in rear of the left file of his section.

In Flank Column.

120. The posts are same as when faced with the battery from line, except that in the case of the quartermaster and stable

DUTIES IN DETAIL OF THE DIFFERENT CANNONEERS.

DUTIES OF THE GUNNER.

To Set the Deflection Scale of the Panorama Sight.

143. The limb of the instrument is divided into 64 equal parts. The micrometer scale is divided into 100 equal parts, a complete turn of the micrometer corresponding to one division of the limb. The micrometer, therefore, serves to subdivide the divisions of the limb into 100 parts; hence, the least reading of the instrument is $\frac{1}{6400}$ of the circumference, or $\frac{1}{1000}$ of the radius, very nearly. The least reading is called a ***mil.*** A deflection of one mil corresponds, therefore, to a deviation at the target of $\frac{1}{1000}$ of the range.

To set off a deflection: The gunner turns the headpiece of the instrument until the number of hundreds of the setting is shown by the index of the limb, and the number of tens and units, if any, by the index of the micrometer.

If, in setting the deflection, the headpiece of the instrument has to be moved through a small angle only, the slow-motion screw is used. But if the reading given requires a large angular movement, the slow-motion mechanism is ungeared and the headpiece is turned around by hand. The slow-motion mechanism is then thrown in gear and used to set off the exact setting.

144. The gunner is repeatedly practiced in setting deflections by command. Thus, for example: ***Deflection, 1640.***

The gunner brings the index of the limb between the divisions marked 16 and 17 on the limb; then turns the micrometer until its index reads 40.

The instructor verifies the correct setting of the sight.

145. When numbers are announced as a part of a command, they are habitually announced thus:

25	Twenty-five.
400	Four hundred.
705	Seven hundred and five.
860	Eight, sixty.
3805	Thirty-eight hundred and five.
4000	Four thousand.
4135	Forty-one, thirty-five.
5050	Five thousand and fifty.

But when the telephone is used for the transmission of firing data, or when from any cause it is difficult to make the commands distinctly heard, each digit of the number is called off in turn, thus:

25------------------------Two, five.
130-----------------------One, three, zero.
1056----------------------One, zero, five, six.
4000----------------------Four, zero, zero, zero.

This rule is general.

To Set the Deflection Scale of the Peep Sight.

146. The graduations on the deflection scale of the peep sight correspond to those on the panorama sight, the unit of the scale being one mil. When set at 0 (or 6400) the line of sight is parallel to the line of fire. Toward the left the readings increase, the maximum reading being 45 mils; toward the right the readings decrease, the minimum reading being 6355 mils.

To set off a deflection: The gunner turns the deflection screw head until the desired graduation is opposite the fixed index.

He is practiced in setting off deflections as before.

NOTE.—The following is a convenient rule for correcting observed errors in deflection: *To throw the projectile to the left, increase the deflection; to throw it to the right, diminish the deflection.*

To Set the Sight for Range.

147. The range scale is graduated from 0 to 6250 yards, the least reading being 50 yards. The scale may be readily set by the eye to read to 25 yards.

To set off a range: The gunner moves the sight shank up or down in its socket until the desired graduation is opposite the index.

The sight shank is moved up or down by means of a scroll gear. If a considerable movement of the shank is necessary, this mechanism is ungeared by drawing outward the scroll-gear handle with the right hand; the shank is then raised or lowered with the left hand until the desired graduation is near the index. The mechanism is then thrown in gear and utilized to set the scale at the exact setting desired.

148. The gunner is practiced in setting the sight for range, thus: The sight being in its socket, the instructor commands, for example, *Range 2700.*

The gunner sets the sight as just described, and the instructor verifies the setting.

To Correct for Difference of Level of Wheels.

149. The gunner centers the bubble of the transverse level by turning the transverse leveling screw on the sight bracket.

To Lay the Piece.

150. *For both range and direction:* When it is possible for the gunner to see the target clearly and to aim directly upon the part of it which the fire of his gun is intended to reach, the gun is ordinarily laid by the gunner both for range and direction. This is called *direct laying.*

The designation *target* (so and so) is the indication that this method of laying is to be employed.

The gunner causes a cannoneer, working at the trail handspike and sighting over the line sights, to give the piece the general direction. The gunner seats himself astride the seat on the left side of the trail; sets the deflection scale at the deflection ordered, using either the peep or panorama sight, as may be required by the circumstances; sets the range scale at the range ordered; corrects for difference of level of wheels; operates the elevating and traversing apparatus so as to bring the line of sight upon the target; calls *ready* when the gun is laid.

151. The gunner may be practiced in this duty as follows:

The gunner being at his post at the piece unlimbered, the sights in their sockets, the instructor commands, for example:

1. *Target, the chimney on that white house.*
2. *Deflection, 10.*
3. *RANGE, 2400.*

1. At the indication of the target the gunner causes the piece to be pointed at it.

2. Seats himself astride of the gunner's seat, the left foot to the front, the right to the rear.

3. Sets off the deflection ordered.

4. Sets off the range ordered.
5. Corrects for difference of level of wheels.
6. Operates the elevating and traversing apparatus, so as to bring the line of sight upon the target.
7. Calls *ready* when the gun is laid, and takes his post.

The instructor verifies the sight settings, the centering of the bubble of the transverse level, and sees that the gun is laid accurately upon the target.

NOTE.—When firing at stationary targets, the gunner should traverse the gun approximately to the middle point of traverse before the general direction is given from the end of the trail.

152. *For direction only:* When it is impracticable for the gunner to aim directly upon the part of the target which the fire of his gun is intended to reach, the gun is laid by him for direction only. In this case, an aiming point which can be clearly seen by the gunner is designated and a suitable deflection given, such that when the line of sight is directed upon the aiming point the gun will be directed upon the target. This is called *indirect laying*.

The designation *aiming point* (so and so) is the indication that this method of laying is to be employed.

The gunner sets off the deflection, sights along one of the side faces of the headpiece of the panorama sight, and causes a cannoneer at the trail handspike to move the trail to the right or left until the sight is aligned approximately on the aiming point.

The gunner then seats himself astride the gunner's seat, sets off the range, corrects for difference of level of wheels, and, looking through the panorama sight, traverses the piece until the vertical cross hair is on the aiming point.

If the aiming point can not be seen on account of the shield, the gunner turns down the top shield.

The gunner must be careful not to touch the elevating gear in this case.

153. The gunner may be practiced in this duty as follows:

The gunner being at his post at the piece unlimbered, the sights in their sockets, the instructor commands, for example:

1. *Aiming point, the chimney on that white house.*
2. *Deflection, 240.*
3. *RANGE, 3300.*

1. At the indication of the deflection the gunner sets it off on the panorama sight.

2. Causes the trail to be shifted until the headpiece of the sight is directed upon the aiming point.
3. Seats himself astride the gunner's seat.
4. Sets off the range ordered.
5. Corrects for difference of level of wheels.
6. Traverses the gun until the vertical cross hair is on the aiming point.
7. Calls *ready* when the gun is laid in direction, and takes his post.

The instructor verifies the sight setting, the centering of the bubble of the transverse level, and sees that the sight is accurately directed upon the aiming point.

NOTE.—Before giving the command for this exercise, the instructor should cause the piece to be elevated for the range of the target, using the quadrant for this purpose.

To Measure the Deflection of a Target from an Aiming Point.

154. The gun being laid directly on the target: The gunner turns the headpiece of the panorama sight until the vertical cross hair is on the aiming point; the reading of the instrument is then the deflection sought.

NOTE.—When the sight is directed upon the target, the deflection reading should be zero, unless a deflection for drift or wind has been set off.

155. The gunner may be practiced in this duty as follows:

The gun being laid in direction on any target, and the gunner seated astride the seat, the instructor commands, for example:

1. *Aiming point, that clock tower.*
2. *MEASURE THE DEFLECTION.*

1. The gunner turns the headpiece of the panorama sight until the vertical cross hair is on the designated aiming point.
2. He then reads and announces the deflection, thus: *Deflection 490.*

The instructor verifies the reading and sees that the sight is accurately directed upon the aiming point.

DUTIES OF NO. 1.

To Open the Breech.

156. No. 1 grasps the operating lever with his left hand, and compresses the lever latch. He then draws the lever to the rear and right, thus swinging the block to the right.

To Close the Breech.

157. No. 1 grasps the operating lever with his left hand, pushes the lever to the left, and swings the block smartly to its seat.

To Set Off an Angle of Site.

158. The clinometer scales of the quadrant comprise the limb and the micrometer. The limb is an arc graduated in divisions of 100 mils each. The divisions are marked 2, 3, 4; but they are to be read 200, 300, 400 mils. The micrometer is a beveled disk at the upper end of the clinometer level screw; its periphery is divided into 100 equal parts, and, as one complete turn of the level screw moves the index of the limb over one division or 100 mils, the least reading of the micrometer is 1 mil.

The graduation 3 (or 300) on the scale corresponds to targets which are on the same level as the gun. Angles of site greater than 300 correspond to targets above the level of the gun and those less than 300 to targets below that level. A variation of 1 mil in the angle of site corresponds to a difference of level of $\frac{1}{1000}$ of the range.

To set off an angle of site: No. 1 turns the clinometer level screw so that the index of the limb shows the number of hundreds of the setting, and the index of the micrometer shows the number of tens and units of the setting.

159. No. 1 may be practiced in this duty as follows:

The quadrant being in or out of its socket, the instructor commands, for example: *Angle of site, 355.*

No. 1 turns the clinometer level screw until the index of the limb is between the graduation marked *3* and the graduation marked *4,* and the index of the micrometer reads *55.*

The instructor verifies the setting.

To Set the Quadrant for Range.

160. The range disk of the quadrant is graduated from 0 to 6,500 yards, the least reading of the scale being 50 yards. A given range is set off by turning the elevating handwheel until the index is brought opposite the designated reading. If a considerable change of reading has to be effected, the slow-motion mechanism is ungeared by drawing out the handwheel. The index is then turned quickly to the vicinity of the desired setting; by releasing the tension on the handwheel the slow-motion mechanism is then thrown in gear and used to effect an accurate setting.

161. No. 1 may be practiced in this duty as follows:

The quadrant being in or out of its socket, the instructor commands, for example: ***Range, 2550.***

No. 1 manipulates the handwheel, as above described, until the index is brought opposite the designated reading.

The instructor verifies the setting.

To Correct for Difference of Level of Wheels.

162. No. 1 centers the bubble of the transverse level by turning the transverse level screw.

To Lay the Piece for Range.

163. In indirect laying, the piece is habitually laid for range by No. 1, while the gunner lays for direction only.

No. 1 sets off the angle of site, sets the quadrant for range, corrects for difference of level of wheels, then centers the bubble of the clinometer level by turning the elevating crank.

164. No. 1 may be practiced in this duty as follows:

The quadrant being in its socket, and No. 1 sitting astride the seat on the right side of the trail, facing the carriage, the instructor commands, for example:

1. ***Angle of site, 280.***
2. ***Range, 3400.***

As the data are announced, No. 1:

1. Sets off the angle of site.
2. Sets the quadrant for range.
3. Corrects for difference of level of wheels.
4. Centers the bubble of the clinometer level by turning the elevating crank.
5. Calls ***set*** when the piece is correctly laid, and takes his post.

The instructor verifies the quadrant settings and the centering of the bubbles.

To Measure the Angle of Site.

165. The angle of site of any designated target may be measured by sighting directly on the target with the sight set at an indicated range; then setting the quadrant range disk for the same range, turning the clinometer level screw so as to center the bubble of the clinometer level, and taking the reading of the clinometer scales.

166. No. 1 may be practiced in this duty as follows:

Having caused the piece to be accurately laid on the target by means of the sight set at an indicated range, the instructor commands, for example:

1. *Range, 2700.*
2. ***MEASURE THE ANGLE OF SITE.***

At the last command, No. 1:

1. Sets off the range on the range disk.
2. Corrects for difference of level of wheels.
3. Centers the bubble of the clinometer level by turning the clinometer level screw.
4. Calls out the angle of site as soon as measured, thus: *Angle of site 330,* and takes his post.

The instructor verifies the quadrant settings and the centering of the bubbles.

To Fire the Piece.

167. The piece being loaded and laid, the instructor commands *Ready.* At this command, No. 1 grasps the firing handle with the left hand. At the command: 1. *No. 1* (*or such number*), 2. ***FIRE,*** No. 1 draws the handle smartly downward so as to trip the trigger arm.

NOTE.—It is most important that No. 1 should become habituated to firing with the left hand, as the danger of firing while the hand is on the operating lever is thus obviated.

DUTIES OF NO. 2.

To Give the General Direction to the Piece.

168. No. 2 is practiced in pointing the piece quickly and accurately upon different objects. For this purpose, he stands at the left of the trail handspike, grasps its end with the right hand, its middle with the left, looks along the line sights and shifts the trail to the right or left so as to direct the gun upon the target.

169. The instructor commands, for example:

1. *Target, the smokestack of that factory.*
2. *AIM.*

No. 2 takes the position above described, points the piece quickly on the object designated, and resumes his post.

The instructor verifies the pointing.

To Load the Piece.

170. No. 2 receives cartridges from No. 4 and inserts them in the chamber. While so doing, he stands in the most convenient position to reach the cartridges which are passed to him on the one side, and to insert them in the chamber on the other. He takes care to stand clear of the breech during recoil.

In loading the piece, No. 2 holds the middle of the projectile in his left hand, the base of the cartridge with his right. He inserts the head of the projectile in the chamber and then shoves it smartly forward. The closing of the breech block insures the proper seating of the projectile.

171. Except in rapid fire, No. 2 receives the empty cartridge cases as they are ejected from the piece, and passes them to No. 4 or No. 5, as may be most convenient, to be placed in the ammunition chest. In rapid fire, the cases are picked up and stored when opportunity offers.

172. When using drill cartridges, No. 2 always receives the cartridge as it is ejected and passes it to No. 4 or No. 5.

DUTIES OF NOS. 3, 4, AND 5.

173. Nos. 3, 4, and 5 serve ammunition. The special duty of No. 3 is to keep the fuse setter scales set at the readings ordered; that of No. 4 to set fuses and pass cartridges to No. 2; and that of No. 5 to take cartridges from the chest and pass them to No. 4.

174. While serving ammunition, Nos. 3, 4, and 5 take the positions best suited to performing their special duties and to securing the maximum protection from the caisson and shield.

175. Nos. 3, 4, and 5 should be trained to perform one another's duties so that in action they may relieve one another from time to time. After being thoroughly instructed in their individual duties, they should be drilled together in serving ammunition, it being most important to develop: (1) accuracy and rapidity in the setting of fuses; (2) a quick and orderly method of passing cartridges from hand to hand.

To Set the Fuse-Setter Scales.

176. The fuse setter has a range scale and a corrector scale. The range scale is graduated in yards from 0 to 6500, its least reading being 50 yards.

The corrector scale is graduated uniformly into 60 divisions, numbered 0, 10, 20, * * * 60. Under normal conditions a change of fuse setting by one unit of this scale changes the time of burning of the fuse so as to produce a variation in the height of burst of the projectile of one mil. Corrector 30, the middle graduation of the scale, corresponds to the normal height of burst (3 mils).

177. *Increasing the corrector shortens the time of burning of the fuse and hence increases the height of burst of the projectile; decreasing the corrector lengthens the time of burning of the fuse and hence decreases the height of burst of the projectile.*

The corrector scale thus affords the means of correcting the observed error in height of burst and adjusting the mean point of burst at the normal height.

178. To set the instrument, the instructor announces the corrector and the range; No. 3 turns the corrector worm so as to bring the movable index opposite the corrector reading ordered; he then turns the range worm so as to bring the range reading opposite the fixed index of the range scale.

No. 3 may be practiced in this duty as follows:

The instructor commands for example:

Corrector, 25.
RANGE, 2900.

No. 3:

1. Sets off the corrector ordered.
2. Sets off the range ordered.

The instructor examines and verifies the settings.

To Set Fuses.

179. To set a fuse, insert the point of the projectile in the fuse setter so that the rotating pin on the time train of the fuse will engage in the corresponding notch in the fuse setter. Holding the body of the projectile down upon the guide, and pressing the point firmly into the fuse setter socket, turn the projectile to the right until the spring plunger in the fuse setter engages against the shoulder of the notch cut in the fuse body. A steady and comparatively slow rotation of the projectile is necessary in order to secure uniform results. If the projectile is turned rapidly and with great force, the plunger may pass over the notch and may thus fail to stop the rotation of the projectile.

No. 4 may be practiced in the duty of setting fuses by causing an extra cannoneer (representing No. 5) to pass projectiles to him, requiring No. 4 to set the fuse, and then to pass the projectile to another cannoneer occupying the position of No. 2. Or Nos. 2, 3, 4, 5 may to great advantage be trained together in their combined duties in the service of ammunition.

NOTE.—If the hand fuse setter is used instead of the bracket fuse setter, it is employed in a manner similar to that described above; No. 5 passing the projectile to No. 4, and No. 4 holding the projectile so that No. 3 may operate the fuse setter.

CHAPTER III.—THE GUN SQUAD.

SECTION I.—*General provisions.*

180. As soon as the cannoneers have been instructed in their individual duties, they are taught to work together as a ***gun squad***.

181. The efficient service of the gun depends upon the orderly cooperation of the members of the gun squad, as well as upon the skill of the individual cannoneers. The habit of combined effort must hence be acquired.

182. An alert and soldierly manner is exacted of the cannoneers, and they should be taught to perform their duties as briskly and rapidly as is consistent with efficient service.

SECTION II.—*Dispositions and exercises incidental to the service of the piece.*

Composition of the Gun Squad.

183. The cannoneers assigned to the service of a gun section constitute a ***gun squad***.

184. For the service of the three-inch, rapid-fire gun, the squad is ordinarily composed of two corporals and not less than five privates. The senior corporal is the ***gunner;*** the junior the ***caisson corporal.***

185. The cannoneers assigned to the service of a caisson section constitute a ***caisson squad.*** It consists of two corporals and such number of cannoneers as may be assigned. The senior corporal is caisson corporal of the ***first caisson*** (par. 542) of the section; the junior, of the ***second caisson*** of the section. Instructions prescribed for the gun squad apply also to the caisson squad, with obvious modifications—the senior caisson corporal performing the duties prescribed for the gunner, as far as practicable.

Formation of the Gun Squad.

186. The gun squad is formed in double rank in the following order from right to left: No. 1 on the right of the front rank; No. 2 in rear of No. 1; No. 3 on the left of No. 1; No. 4 on the left of No. 2; and so on—the odd numbers in the front rank and the even numbers in the rear rank. The gunner is on the right and the caisson corporal on the left of the front rank, both uncovered in the rear rank.

If there is an odd number of cannoneers the highest odd number is covered by the highest even number.

C. C.	7	5	3	1	G.

1 yard.

	6		4	2	

187. The caisson squad is formed in double rank as follows: Nos. 4, 5, 6, 7, etc., of the first caisson, in the front rank in the order named from right to left, covered in the rear rank by Nos. 4, 5, 6, 7, etc., of the second caisson. The senior corporal is on the right and the junior corporal on the left of the front rank, both uncovered in the rear rank.

If there are more cannoneers in the rear rank than in the front rank the highest numbered cannoneer in the rear rank steps into the front rank and is covered by the next highest number.

C. C.	7	6	5	4	C. C.

1 yard.

7	6	5	4

188. At mounted formations the caisson corporals are ordinarily mounted, and are posted as described in The Battery Mounted (par. 559).

189. When thoroughly instructed the men are permanently assigned to the duties for which they are best fitted.

To Form the Gun Squad.

190. The instructor indicates the place of formation and commands: ***FALL IN.***

The gunner repeats the command and hastens to place himself where the right of the squad is to rest, faced in the proper direction.

The cannoneers move at double time and form in line on the left of the gunner in two ranks.

191. The place of formation is indicated and the command given thus, for example: 1. ***In front (rear) of the piece (caisson),*** 2. ***FALL IN;*** or, 1. ***On the right (left) of the gun facing toward it,*** 2. ***FALL IN.***

192. In case the front or rear of one of the carriages is designated the squad falls in at its post (pars. 196 and 197).

To Tell Off the Gun Squad.

193. ***CALL OFF.***

The cannoneer on the right of the front rank calls off ***one;*** the cannoneer on the right of the rear rank, ***two;*** the cannoneer on the left of No. 1, ***three;*** and so on; the gunner and caisson corporal do not call off.

194. In a caisson squad the cannoneers of the front rank fall off first, thus: ***Four, five, six,*** etc., in order from right to left; followed in the same order by the cannoneers of the rear rank.

195. After having called off, the cannoneers fall in at once in their proper order, if a subsequent formation is ordered.

Posts of the Gun Squad, Carriages Limbered.

196. *In front of the piece or caisson.* The squad is in line facing to the front, its rear and center two yards from the end of the pole or from the heads of the lead horses.

197. *In rear of the piece or caisson.* The squad is in line facing to the front, its front and center two yards from the muzzle, or the rear of the caisson.

198. If no special place of formation is designated, the squad, when formed at the carriages, is posted in front of the leading carriage.

To Post the Gun Squad.

199. The squad is marched to the park, and, on arrival near the carriages, the instructor commands: ***Squad in front*** (***rear***) ***of your piece*** (***caisson***).

The gunner marches the squad to the carriage and posts it in the indicated position.

NOTE.—The instructor habitually causes the squad to approach the front (rear) of the carriage which he designates in his command, from the right flank if left in front and from the left flank if right in front.

Posts of the Cannoneers, Carriages Limbered.

200. The gunner and No. 1 opposite the rear of the limber wheels of the piece.

Nos. 2 and 3 opposite the front of the gun wheels.

Nos. 4 and 5 opposite the rear of the caisson wheels.

Nos. 6 and 7 opposite the front of the limber wheels of the caisson.

Nos. 8 and 9 opposite the middle of the pole of the caisson.

If the caisson corporal be present, dismounted, he is opposite the end of the pole of the caisson.

The gunner and even numbers are on the right, the caisson corporal and odd numbers on the left; all two feet outside the wheels, facing the front.

If numbers higher than No. 9 are present, they are assigned posts by the instructor.

To Post the Cannoneers.

201. 1. ***Cannoneers***, 2. ***POSTS***. The gunner repeats the command ***posts***. The cannoneers leave the ranks, if formed, and move at double time by the shortest practicable route to their posts at the carriages.

NOTE.—For preliminary instruction, the squads, on entering the park, are first posted with their carriages; the cannoneers are then sent to their posts by the foregoing command. The command is general, however, and is applicable when the cannoneers are in or out of ranks, at a halt or marching, and when the carriages are limbered or unlimbered.

To Mount the Cannoneers on the Carriages Limbered.

202. The gunner and No. 1 mount on the limber chest of the piece.

Nos. 2 and 3 mount on the axle seats.

Nos. 4 and 5 mount on the caisson chest.

Nos. 6 and 7 mount on the limber chest of the caisson.

No. 8 mounts between Nos. 6 and 7.

No. 9 mounts between Nos. 4 and 5.

The gunner and even numbers mount on the right side of their respective carriages, odd numbers on the left.

The instructor gives special directions for mounting cannoneers not herein provided for.

203. 1. ***Cannoneers, prepare to mount***, 2. ***MOUNT.***

At the first command, the cannoneers who mount on the limber chests or axle seats hasten to the rear of the limber chests or axle seats; those who mount on the caisson chest hasten to the front of that chest. Each cannoneer who mounts on the limber chest places the foot nearest the wheel on the step, grasps the chest handle with the hand nearest the wheel, and with the other hand grasps the hand of the cannoneer opposite him. Each cannoneer who mounts on the caisson chests places the foot nearest the wheel on the step, and grasps the chest handle with the hand nearest the wheel. Cannoneers who mount on the axle seats place the foot nearest the wheel on the brake beam, and grasp the seat handle with the hand nearest the wheel.

At the command ***mount***, all spring up and seat themselves, those on the chests facing to the front, those on the axle seats to the rear. Those who mount on the limber chests place the foot farthest from the wheel on the top of the limber chest, and then step down on the footboard.

204. If the command be: 1. ***Cannoneers***, 2. ***MOUNT***, the cannoneers execute, at the command ***mount***, all that has been prescribed for the commands ***prepare to mount*** and ***mount***.

To Dismount the Cannoneers from the Carriages.

205. 1. ***Cannoneers, prepare to dismount,*** 2. ***DISMOUNT.***
The cannoneers on the chests stand up on the footboards at the first command; at the second command all the cannoneers jump to the ground and take their posts.

206. If the commands be: 1. ***Cannoneers,*** 2. ***DISMOUNT,*** they execute, at the command ***dismount,*** all that has been prescribed for the commands ***prepare to dismount*** and ***dismount.***

To Move by Hand the Carriages Limbered.

207. ***To the front:*** 1. ***Piece (Caisson) forward,*** 2. ***MARCH,*** 3. ***Halt.*** At the first command the gunner and No. 1 hasten to the end of the pole; Nos. 2 and 3 to the limber wheels; Nos. 4 and 5 to the rear wheels; higher numbered cannoneers to the rear of the carriage, the gunner and even numbers working on the right side of the carriage, odd numbers on the left. The cannoneers who work at the pole or at the wheels grasp the same with both hands; those in rear of the carriage prepare to push against the most convenient part of the carriage.

At the command ***march,*** all assist in moving the carriage to the front. At the command ***halt,*** the carriage is stopped, the pole is lowered to the ground, and all resume their posts.

208. ***To the rear:*** 1. ***Piece (Caisson) backward,*** 2. ***MARCH,*** 3. ***HALT.*** Executed as in the preceding paragraph, except that at the command ***march*** the cannoneers move the carriage to the rear, and that the higher numbered cannoneers place themselves in front of the rear axle of the carriage and push against the most convenient part of the carriage.

Posts of the Cannoneers, Carriages Unlimbered.

209. The gunner, immediately in rear of the cannoneer's seat on the left side of the trail of the gun.

No. 1, immediately in rear of the cannoneer's seat, on the right side of the trail of the gun.

No. 2, two feet in rear of the gunner, covering him.

Nos. 3, 4, and 5, two feet in rear of the caisson chest in the order named from right to left.

Nos. 6 and 7, two feet in rear of the limber chest of the caisson, No. 6, on the right.

Nos. 8 and 9, two feet in rear of the limber chest of the piece, No. 8 on the right.

The caisson corporal, if present, dismounted, is four feet in rear of the middle of the limber chest of the caisson.

Higher numbered cannoneers, if present, are posted at the discretion of the instructor. Unless otherwise directed, the cannoneers, when not serving the piece, stand at attention at their posts, facing to the front.

210. When serving the piece, in either actual or simulated firing, the gunner and No. 1 habitually seat themselves on the seats provided for them; Nos. 3, 4, and 5 kneel behind the caisson.

To Change the Posts of the Cannoneers.

211. In order to exercise the cannoneers in all duties connected with the service of the piece, the posts of the cannoneers are frequently changed.

212. The cannoneers being at their posts, carriages limbered or unlimbered: 1. *Change posts,* 2. ***MARCH.***

No. 1 takes the post of No. 2; No. 2 of No. 3; No 3 of No 4; No. 4 of No. 5; No. 5 of No. 1.

213. The gunner should be changed frequently with the caisson corporal, in order that the latter may be thoroughly trained in the duties of gunner.

Disposition of the Carriages Before and After Unlimbering.

214. *Before unlimbering:* The piece and its caisson are placed abreast of each other, two yards apart, poles pointing in the same direction. This formation of the carriages is called a *double section.*

215. If it is intended to fire to the front, the caisson is placed on the left of its piece; if to the rear, on the right of its piece; if to the flank, on either side of the piece.

216. When not horsed, the carriages are drawn by the cannoneers, and the instructor gives the necessary instructions for moving the carriages by the shortest routes into the prescribed positions.

217. *After unlimbering:* The adjacent wheels of the gun and caisson are about one foot apart, the gun muzzle and the caisson trail pointing to the front, the gun on the right and slightly in advance of the caisson.

NOTE.—The gun is placed slightly in advance to allow for recoil at the first shot, which on ordinary ground is about ten inches.

218. In active service, and in instruction simulating service conditions, the limbers are placed under cover in the vicinity of the position; if no cover is obtainable in the vicinity they are placed in line in rear of either flank at such place as the instructor may designate.

219. On occasions of ceremony, or when a post on the flank is not designated, the caisson limber is placed directly in rear of its caisson, the heads of the lead horses (or the end of the pole) twenty-five yards in rear of the caisson, facing to the front. The piece limber is placed on the right of the caisson limber, two yards from and abreast of it.

Preparation for Action.

220. The carriages being either limbered or unlimbered: ***PREPARE FOR ACTION.***

The gunner releases the traversing and elevating lock and operates the traversing and elevating apparatus; removes the hood from the sight standard; takes the sights from their cases and places them in their sockets. Assisted by No. 1, he raises the top shield and fastens it.

No. 1 removes the quadrant from its case and places it in its seat; operates the breech, examines the bore, the breechblock, and the chamber, cleaning with a wiping cloth any parts requiring it; equips himself with a lanyard and assists the gunner in raising the top shield.

No. 2 removes the breech cover, assists in lowering the apron, and distributes tow or waste to the cannoneers for use in their ears.

No. 3 removes the muzzle cover, adjusts the front sight in the firing position, and assists in lowering the apron.

Nos. 4 and 5 lower the caisson apron.

The cannoneers report to the instructor if any parts of the material are not in working order.

221. The command ***prepare for action*** is always given before firing and at such other times as may be necessary for instruction.

To Unlimber.

GENERAL RULES.

222. 1. In unlimbering to fire to the front, the caisson establishes the position.

2. In unlimbering to fire to the rear, the piece establishes the position.

3. In unlimbering to fire to the flank, the element (gun or caisson) on the side toward which fire is to be directed establishes the position.

4. If the carriages, after unlimbering, have to be moved by hand to the firing position, all the cannoneers of the gun squad assist at each carriage in turn in running it to the designated position.

5. When cannoneers higher in number than No. 5 are present, they habitually assist in unlimbering the carriages and in moving them, when necessary, to the firing position, after which they take post with the limbers.

6. If the carriages are not horsed, they are unlimbered successively, the one which establishes the position being unlimbered first. The limbers are drawn by cannoneers designated by the instructor. Thus, if only the gunner and five cannoneers are present, the cannoneers posted with the piece may be required to move the limber of the caisson, and those with the caisson, the limber of the piece. If higher numbered cannoneers are present, however, they are ordinarily used for this purpose.

To Fire to the Front.

223. The caisson being on the left of the piece, two yards from and abreast of it: ***ACTION FRONT.***

If marching, the carriages halt at the command. The cannoneers, if mounted, dismount.

The caisson: No. 4 sets the brake and unlatches the pintle. No. 5 lowers the prop. Nos. 4 and 5 raise the trail from the pintle, and No. 4 commands: ***DRIVE ON;*** they then lower the trail until the prop rests on the ground. Nos. 4 and 5 raise the door of the caisson chest, No. 4 adjusts the fuse setter in its position for use, and both take their posts at the caisson unlimbered.

The piece: The gunner unlatches the pintle, and, assisted by No. 1, lifts the trail; he then commands: ***DRIVE ON.*** The gun is then turned around 180°, the trail being carried away from the caisson; the gunner and No. 1 work at the end of the trail; Nos. 2 and 3 at the wheels nearest their respective posts, No. 2 turning toward the muzzle, No. 3 toward the trail. The gunner causes the piece to be placed by the side of the caisson in the position prescribed in paragraph 217. No. 2 turns back the trail handspike, and all take their posts at the carriages unlimbered.

Limbers: At the command *drive on,* the limbers take their prescribed positions (pars. 218 and 219). To take posts in rear of the carriages, the caisson limber executes a left about, moves straight to the rear, executes another left about, and halts so that the heads of the lead horses or the end of the pole will be twenty-five yards from the rear of the caisson. The piece limber follows the caisson limber, passes around in rear of it, and halts so as to be abreast of it and two yards to its right.

To Fire to the Rear.

224. The caisson being on the right of the piece, two yards from and abreast of it: ***ACTION REAR.***

Executed like *action front,* with the following modifications: As soon as the piece is unlimbered its trail is lowered to the ground; Nos. 2 and 3 run to the right and left caïsson wheels respectively. The caisson is turned around 180°, its trail being carried away from the piece; Nos. 4 and 5 working at the trail, No. 2 turning from and No. 3 toward the trail. The caisson is placed by the side of the piece in the position prescribed in paragraph 217.

Limbers: To take post in rear of the carriages, the caisson limber inclines well to the right, moves to the rear, executes a left about, and halts so that the heads of the lead horses or the end of the pole will be twenty-five yards from the rear of the caisson. The piece limber follows the caisson limber, passes around in rear of it, and halts so as to be abreast of it and two yards to its right.

To Fire to the Flank.

225. The caisson being on either side of the piece, two yards from and abreast of it: ***ACTION RIGHT (LEFT).***

Executed according to the principles of ***action front*** and ***rear,*** with the following modifications: After the carriages are unlimbered the muzzle of the gun and the trail of the caisson are turned in the direction of fire, and the carriage in rear is run up to its proper position on the line. The carriage on the side toward which fire is to be delivered is first established in position, and then all the cannoneers assist in bringing up the carriage in rear to its proper place.

Limbers: To take post in rear of their carriages, the limber farthest from the flank toward which fire is to be delivered moves out first, wheels away from the direction of fire, and after having gained sufficient distance to the rear executes an about and halts at the prescribed position in rear. The other limber follows and takes its position in a similar manner.

To Move by Hand the Carriages Unlimbered.

226. 1. ***Piece*** (***Caisson***) ***forward*** (***backward***), 2. ***MARCH,*** 3. ***HALT.*** The ***piece:*** The gunner and No. 2 grasp the trail handles, the gunner the left, No. 2 the right handle; Nos. 1 and 3 the right and left wheels, respectively; Nos. 4 and 5 place themselves so as to work advantageously at the breech of the gun in moving forward, at the muzzle in moving backward. At the command ***march,*** all working together move the carriage in the direction indicated. At the command ***halt,*** they stop the carriage and resume their posts.

The ***caisson:*** Executed as explained for the piece, except that Nos. 4 and 5 are at the trail of the caisson and that the gunner and No. 2 work in rear of the caisson chest in moving to the front, against the footboards in moving to the rear.

To Resume the Order for Marching.

227. The carriages being prepared for action, either limbered or unlimbered: ***MARCH ORDER.***

The gunner replaces the sights; secures the hood over the sight standard; traverses and depresses the piece to zero; fastens the traversing and elevating lock; assisted by No. 1, he lowers the top shield and secures it.

No. 1 removes the quadrant and puts it in its case; releases the brake, if set; assists in lowering the top shield, and replaces the lanyard in the trail box.

No. 2 turns back and secures the trail handspike, puts on the breech cover, and assists in raising and securing the apron.

No. 3 puts on the muzzle cover, adjusts the front sight in its traveling position and assists in raising and securing the apron.

No. 4 secures the fuse setter in its traveling position. Nos. 4 and 5 close and secure the caisson door, and raise and secure the caisson apron. All the cannoneers resume their posts.

To Limber.

228. ***To the front and rear:*** 1. ***Limber,*** 2. ***FRONT AND REAR.***

The gunner and No. 1 face to the rear at their posts; No. 2 places himself on the right of the gunner; No. 3 places himself on the left of No. 1; Nos. 4 and 5 hasten to the front of the caisson and lower the trail to the ground; No. 4 releases the brake; No. 5 secures the prop in its traveling position; Nos. 4 and 5 then place themselves with their backs toward the chest, No. 4 on the right, No. 5 on the left of the caisson trail.

If the limbers are in rear of their carriages, the limbers move out together, inclining well to the left. The piece limber wheels to the right so as to move across in rear of the piece, the left wheel passing within about a foot of the lunette. When the axle of the limber is nearly in line with the trail, the gunner commands: 1. ***Limber,*** 2. ***HALT.*** The limber is then swung to the right, the wheels turning equally in opposite directions, is halted directly in front of the carriage and then backed slightly. The gunner and No. 1 raise the trail and place the lunette over the pintle; the gunner latches the pintle.

After moving far enough to the front, the caisson limber wheels to the right so as to move across in front of the caisson, the right wheel passing within about a foot of the lunette. It is halted at the command of No. 4 and swung to the left. The caisson is then limbered by Nos. 4 and 5 in a manner similar to that prescribed for the piece.

All the cannoneers take their posts at the carriages limbered.

If the limbers are posted on the flank, they approach the carriages in section column and separate as they reach the vicinity of the carriages, the piece limber passing along the rear, the caisson limber along the front of the position. Each limber proceeds to its own carriage and is limbered up in accordance with the foregoing principles.

If the carriages are not horsed, the limbers are drawn by cannoneers designated by the instructor. They move first the caisson and then the piece limber.

229. *To the rear:* 1. *Limber,* 2. ***REAR.***

The caisson is turned around 180°, the trail being carried away from the piece, the carriage turning on the left wheel; Nos. 4 and 5 work at the trail, Nos. 1 and 3 at the right and left wheels, respectively, the gunner and No. 2 in rear of the chest. As soon as the caisson is turned about, the trail is lowered to the ground; all the cannoneers then go to the piece, which is run straight to the rear and halted when it has cleared the caisson about ten yards. The cannoneers then take their posts for limbering. The limbers, if in rear of the carriages, do not move out until the piece has been halted; they then take their positions and are limbered as prescribed in the preceding paragraph. If posted on the flank, they separate as they approach the position, each limber going to its own carriage.

To Leave the Park.

230. At the conclusion of the instruction in the park the instructor causes the carriages to be properly cared for, forms the squad, marches it to the battery parade ground, and dismisses it.

231. In the instruction of several squads, the instructor causes the squads to be formed in front or rear of the carriages, faces them to the right or left, and commands: 1. *Close,* 2. ***MARCH.*** The leading squad stands fast, the others close on the leading squad. The squads are then marched to the battery parade ground and dismissed.

SECTION III.—*The service of the piece.*

General Provisions.

232. 1. The individual duties of the cannoneers in loading, laying, fuse setting, etc., are performed as prescribed in The Cannoneer.

2. In firing instruction, a target or aiming point is designated, the firing data announced, and the operations of setting sights and fuses, loading, pointing, and firing the piece are habitually performed just as in actual firing.

3. The instructor utilizes every means at his disposal, such as drill cartridges, subcaliber tubes, etc., to simulate as nearly as

possible the conditions which obtain when service ammunition is used.

4. If time admits, it is always advisable to dig a semicircular trench for the trail spade, as soon as the position has been occupied. Great facility in changing targets, and especially in firing at moving targets, is thus gained.

5. As much of the firing data as practicable may be communicated and set off on the instruments before occupying a position or making ready to fire.

In all cases instruments are set and the operations of setting fuses, laying and loading are performed as rapidly as possible after the necessary firing data have been announced.

The announcement of the range as a command is the indication that all the data have been announced, and is the signal for loading. In fire at will, the command *fire at will* is the signal for loading.

The instructor in all cases gives the command or signal for firing, or for commencing the fire.

Methods of Laying.

233. There are two methods: *Direct* and *Indirect.*

234. *Direct laying* consists in bringing the line of sight upon the part of the target which the fire of the gun is intended to reach. In this case the gunner lays the gun for direction by means of the deflection scale of the panorama or peep sight, and for range by means of the range scale. This method is used habitually when the gunner can clearly see through the sight the part of the target assigned to his gun. When direct laying is to be employed, the target is announced in the command, thus: *Target, that blockhouse.*

235. *Indirect laying* consists in taking some well-marked aiming point, generally outside of the target, and setting off a deflection such that when the line of sight is brought upon the aiming point the gun will be properly directed upon the target. In this case, the gunner lays for direction only, and No. 1 lays for range by means of the quadrant.

This method of laying is the rule in all cases when the gunner can not clearly see through the sights the part of the target which the fire of his gun is intended to reach. As quadrant elevation is used, the angle of site of the target must be measured and set off on the quadrant.

When indirect laying is to be employed, the aiming point, and not the target, is announced in the command, thus: ***Aiming point, that white church steeple.***

To Load and Lay.

236. ***Direct laying:*** The piece being unlimbered and prepared for action, the cannoneers at their posts, the instructor commands, for example:

(Time fire.)	(Percussion fire.)
1. ***Target, that column of infantry.***	1. ***Target, that stone house.***
2. ***Deflection, 15.***	2. ***Deflection, 15.***
3. ***Corrector, 28.***	3. ***Shell.***
4. ***RANGE, 2600.***	4. ***RANGE, 2200.***

The cannoneers proceed to the performance of their respective duties as soon as the necessary data have been announced.

The ***gunner:*** 1. Lays for range and direction as prescribed in paragraph 150. If the piece has to be moved through a large angle to bring it on the target, he commands: 1. ***Trail,*** 2. ***RIGHT (LEFT),*** (par. 244).

2. Calls ***ready*** as soon as the piece is loaded and laid.

No. 1: 1. Sets the brake as soon as the piece has been given the general direction.

2. Opens the breechblock, closing it as soon as No. 2 has inserted the cartridge.

3. Grasps the firing handle with the left hand when the gunner calls ***ready.***

No. 2: 1. Springs to the end of the trail and gives the piece the general direction.

2. Receives a cartridge from No. 4 and inserts it smartly in the chamber.

No. 3: 1. Keeps the fuse setter scales set at the range and corrector ordered.

No. 4: 1. Receives a cartridge from No. 5; in the case of percussion fire, passes it at once to No. 2; in the case of time fire, sets the fuse before passing it.

No. 5: 1. Takes cartridges from the chest and passes them to No. 4.

237. ***Indirect laying:*** The piece being unlimbered and prepared for action, the cannoneers at their posts, the instructor commands, for example:

(Time fire.)	(Percussion fire.)
1. ***Aiming point, that clock tower.***	1. ***Aiming point, that windmill.***
2. ***Deflection, 2630.***	2. ***Deflection, 715.***
3. ***Angle of site, 325.***	3. ***Angle of site, 290.***
4. ***Corrector, 28.***	4. ***Percussion shrapnel.***
5. ***RANGE, 2900.***	5. ***RANGE, 3750.***

The cannoneers proceed at once to the performance of their respective duties as soon as the necessary data have been announced.

The ***gunner:***
1. Lays for direction only, as prescribed in paragraph 152. If the piece has to be moved through a large angle to bring it on the target he commands: 1. ***Trail,*** 2. ***RIGHT*** (***LEFT***), (par. 244).

   If the aiming point is in rear, the chief of section goes in front of the piece and causes No. 2 to move the trail so as to direct the headpiece of the panorama sight on the aiming point. The gunner then lays accurately in direction.
2. Calls ***ready*** as soon as the piece is loaded and laid. (The fact that the piece is laid for range is indicated to him by No. 1 calling ***set.***)

No. 1:
1. Sets the brake as soon as the piece has been given the general direction.
2. Opens the breechblock, closing it as soon as No. 2 has inserted the cartridge.
3. Lays the piece for range as prescribed in paragraph 163.
4. Calls ***set*** as soon as the piece is correctly laid for range.
5. Grasps the firing handle with the left hand when the gunner calls ***ready.***

The duties of Nos. 2, 3, 4, and 5 are as prescribed in the preceding paragraph.

238. It is most important that the gun squad should be drilled persistently and under all possible conditions in their combined duties in the service of the piece, the elements of which are set forth in the two preceding paragraphs. The several duties to be performed are there outlined; the readiest and most effective way of combining them, so as to insure mutual cooperation, is attained by practice and experience.

To Fire the Piece.

239. The piece being loaded and laid, the instructor commands: 1. ***No. 1*** (*or such number*), 2. ***FIRE.***

No. 1 fires the piece as prescribed in paragraph 167.

As soon as the piece is fired, No. 1 opens the breechblock so as to eject the cartridge case; No. 2 receives the cartridge case or drill cartridge and passes it to No. 4 or No. 5, to be put in the chest. In rapid fire, the cartridge cases may be allowed to fall to the ground, and are collected and stored afterwards.

240. When using cartridges with dummy fuses, No. 5 may be required to set the fuses at ***safety*** after firing, and then return them to the chest or to No. 4 to be reset.

241. The gunner and No. 1 usually remain on the seats during the firing of the piece, steadying themselves by grasping the top of the shield or other convenient part of the carriage.

When the ground is particularly unfavorable for the engagement of the trail spade, however, the instructor may caution: ***With the lanyard.*** In this case, the gunner and No. 2 step clear of the wheels; No. 1 engages the hook of the lanyard in the eye of the firing handle, steps clear of the wheel and stands at attention, facing to the front, the end of the lanyard grasped in the left hand; at the command ***fire,*** he draws the lanyard toward him with a sharp jerk. The gunner and No. 1 then resume their seats and No. 2 resumes his post.

To Reload and Relay.

242. If the instructor desires to fire again at the same target, he makes such changes as may be necessary in the firing data by commands similar to those in paragraphs 236 and 237. He does not repeat data which he desires to remain unchanged from the previous fire, except that he always announces the range as a definite signal that loading is to be proceeded with.

For example:

(Direct laying, time fire.)	(Indirect laying, time fire.)
1. *Corrector, 33.*	1. *Deflection, 2650.*
2. ***RANGE, 3300.***	2. ***RANGE, 2900.***

The piece is loaded, laid, and made ready for firing as soon as the necessary data are announced.

To Change from Direct to Indirect Laying.

243. If on account of lack of visibility of the target or other causes it becomes desirable to pass from direct to indirect laying, the instructor commands, for example:

1. *Aiming point, that lone tree.*
2. ***MEASURE THE DEFLECTION AND THE ANGLE OF SITE.***

The gunner measures and announces the deflection as explained in paragraph 154.

No. 1 measures and announces the angle of site as explained in paragraph 165, using the range at which the range scale of the sight is set.

The instructor then gives the necessary commands for loading and laying as explained in paragraph 237.

To Shift the Trail.

244. If it becomes necessary to move the trail to the right or left, either because the limit of traverse is reached or in order to fire at a target in a new direction, the instructor commands: 1. *Trail*, 2. ***RIGHT*** (***LEFT***).

The gunner repeats the command and traverses the piece until the azimuth pointer is at the middle of its scale. If following a target moving across the range, he traverses the muzzle of the gun as far as possible in the direction opposed to the movement of the target. For example, if the target is moving to the left, he traverses the muzzle as far as possible to the right. No. 1 releases the brake, No. 2 springs to the trail handspike, No. 1 to the right wheel, No. 3 to the left. Under the direction of the gunner, they turn the carriage until the line of sight comes approximately on the target or aiming point. As soon as the trail has been properly shifted, the gunner calls ***Posts;*** No. 1 sets the brake and all the cannoneers quickly resume their posts.

To Change Target.

245. To fire at a new target, the instructor commands: ***CHANGE TARGET.*** He at once points out the new target in direct laying, or announces the new deflection in indirect laying.

For example:

(Direct laying.)	(Indirect laying.)
CHANGE TARGET, THAT BATTERY.	1. ***Change target, aiming point the same,*** 2. ***DEFLECTION 2500.***

If the change of direction is such as to require it, the gunner commands: 1. ***Trail,*** 2. ***RIGHT*** (***LEFT***), and causes the piece to be prepared for firing in the new direction, as explained in the preceding paragraph. In indirect laying he at once sets off the new deflection, so that he may be able to direct the line of sight on the aiming point.

If the change of position is such as to make it necessary, and time admits, the caisson is then moved by Nos. 2, 3, 4, and 5 to its normal position by the side of the gun.

The instructor then announces the firing data, and the piece is loaded, laid, and fired as previously prescribed.

The gun squad should be frequently practiced in the important exercise of changing target.

To Discontinue and to Resume the Fire.

246. To suspend the fire, the instructor commands or signals: ***CEASE FIRING.*** The signal for ***cease firing*** is a long blast on the whistle; or, the arm raised and held vertical until the signal is obeyed.

The loading and firing are discontinued. No. 1 opens the breech. If a cartridge is in the breech, No. 2 removes it and passes it to No. 4. The fuse is set at ***safety*** and the projectile returned to the chest. The cannoneers remain at ease.

247. To resume the fire, the instructor gives the necessary commands for resuming the interrupted method of fire, or for taking up a new one.

If it is not intended to resume the fire the instructor commands: 1. ***Cease firing,*** 2. ***MARCH ORDER.***

If, on the other hand, it is intended to resume fire immediately, but in another position, so that the limbering of the carriages is necessitated, the command ***march order*** is not given. At the command for limbering, Nos. 4 and 5 close the caisson door and raise and secure the fuse-setter bracket. They raise the caisson door and lower the bracket again without command, upon reaching the new position for action.

If the ground is very rough, or is covered with rocks or stumps of trees, the captain also requires the aprons to be secured in the traveling position before commencing the movement.

Special Methods of Fire.

248. The methods of fire usually employed to produce effect upon a target are: ***Continuous fire, Volley fire,*** and ***Zone fire.*** Each of these may be used with or without sweeping. ***Fire at will*** is a special method of fire adapted to the close defense of the gun. It is without sweeping.

249. *Sweeping* is employed only with time shrapnel and during fire for effect. Its purpose is to distribute the fire over a wide front. It consists in changing the direction of the piece between shots by a full turn of the traversing handwheel.

The number of rounds fired in a sweep is ***three,*** unless a greater number is specified in the command (par. 324). The first round is fired with the piece directed upon the right portion of its target, and the other rounds are fired after traversing the piece to the left[a] by a turn of the handwheel. The number of turns is thus always one less than the number of rounds fired.

The execution of sweeping is explained below under the several methods of fire

CONTINUOUS FIRE.

250. In continuous fire, rounds are fired at regular intervals until cessation of the fire is ordered.

The firing data are determined by a previous fire for adjustment, and the same data are used for all the rounds, unless the instructor, during the progress of the fire, announces new data.

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[a] In *zone fire sweeping* the traverse is to the ***right*** in the case of the second and fourth ranges used in the rafale.

251. ***Without sweeping:*** The target or aiming point being well understood, and the firing data established, the instructor commands, for example:

1. ***Continue the fire.***
2. ***RANGE, 2950.***

The piece is loaded, laid, and made ready for firing continuously with the same data, the instructor giving the command for firing in each case. He gives the command so that there will be the desired interval between shots. When he desires the fire to cease he commands: ***Cease firing.***

If, during the progress of the fire, the instructor announces a change in the data, the change is effected for the next round after the announcement is made and without interrupting the continuity of the fire.

252. ***With sweeping:*** The target or aiming point being well understood, and the firing data established, the instructor commands, for example:

1. ***Continue the fire.***
2. ***Sweeping.***
3. ***RANGE, 3125.***

Executed as in paragraph 251, with the following modifications: The first round is fired with the line of sight directed on the right portion of the target or on the aiming point. Before firing each of the succeeding rounds of the sweep, the gunner traverses the piece to the left by a full turn of the handwheel, and for these rounds disregards accurate laying in direction.

The number of rounds in the sweep is always ***three,*** unless a different number is specified in the command.

As soon as the last round of the sweep has been fired the gunner traverses the piece back to the right until the line of sight is again on the right portion of the target or on the aiming point, and commences a new sweep. The fire is thus continued until ***cease firing*** is ordered. The command for firing is in each case given by the instructor.

VOLLEY FIRE.

253. In volley fire each piece fires a certain number of rounds as rapidly as is consistent with accurate laying and orderly service of the piece.

For volleys ***without sweeping,*** the number of rounds to be fired in the volley is always specified in the command; for volleys ***with sweeping,*** the number of rounds is ***three,*** unless a different number is specified in the command.

The firing data are determined by a previous fire for adjustment; the same data are used for all the rounds of the volley.

254. ***Volleys without sweeping:*** The target or aiming point being well understood, and the firing data established, the instructor commands, for example:

1. ***Volley fire.***
2. ***Three rounds.***
3. ***RANGE, 2800.***

The piece is at once loaded and laid for the first round, as prescribed in paragraph 236 or paragraph 237, but the firing does not commence until the instructor commands: ***Commence firing.*** At this command the gunner commands: 1. ***Ready,*** 2. ***FIRE.*** At the second command No. 1 fires the piece. The operations of setting fuses, loading, laying, and firing are then carried on continuously until the specified number of rounds has been fired, the command for firing being given by the gunner as soon as the piece is loaded and laid.

To avoid mistakes, No. 4, as he passes each cartridge to No. 2, calls out the range and the number of the round in the volley, thus:

2800-----------------------------------One.
2800-----------------------------------Two.
2800-----------------------------------Three.

255. ***Volley with sweeping:*** The target or aiming point being well understood, and the firing data established, the instructor commands, for example:

1. ***Volley fire.***
2. ***Sweeping.***
3. ***RANGE, 1800.***

Executed as explained for a volley without sweeping, with the following modification: The first round of the volley is fired with the line of sight directed on the right portion of the target or on the aiming point. Before firing each of the succeeding rounds of the volley the gunner traverses the piece to the left by a full turn of the handwheel, and for these rounds disregards accurate laying in direction.

As soon as the last round of the volley has been fired the gunner traverses the piece back to the right until the line of sight is again on the right portion of the target or on the aiming point.

ZONE FIRE.

256. In zone fire each piece fires a fixed number of rounds at each of four ranges 100 yards apart. The rounds are fired with the greatest rapidity consistent with accurate laying and orderly service of the piece.

If the fire is ***without sweeping***, two rounds are fired at each of the four ranges, or eight rounds in all; if the fire is ***with sweeping***, three rounds are fired at each of the four ranges, or twelve rounds in all.

The firing data are determined by a previous fire for adjustment. The same firing data are used for all the rounds, except that the elevation and fuse setting are changed by 100 yards by the appropriate cannoneers between each group of two (or three) rounds.

The initial range, which is always the minimum range to be employed, is announced in the command. The fire is commenced at this range and is carried on without intermission until the full number of rounds at all four ranges has been fired.

257. ***Without sweeping:*** The target or aiming point being well understood, and the firing data established, the instructor commands, for example:

1. ***Zone fire.***
2. ***RANGE, 3500.***

The piece is at once loaded and laid for the first round, as prescribed in paragraph 236 or paragraph 237, but the firing does not commence until the instructor commands: ***Commence firing.*** At this command the gunner commands: 1. ***Ready,*** 2. ***FIRE.*** At the second command No. 1 fires the piece. The operations of setting fuses, loading, laying, and firing are then carried on continuously until the total number of rounds has been fired, the command for firing being given by the gunner as soon as the piece is loaded and laid. As soon as the last round at each range has been passed by No. 4 to No. 2, the instructor cautions the new range; and No. 4, as he passes each round, calls out its number in the series, thus:

3500	One.
3500	Two.
(Instructor: ***RANGE, 3600***)	
3600	One.
3600	Two.
(Instructor: ***RANGE, 3700***)	
3700	One.
3700	Two.
(Instructor: ***RANGE, 3800***)	
3800	One.
3800	Two.

258. ***With sweeping:*** The target or aiming point being well understood, and the firing data established, the instructor commands, for example:

1. ***Zone fire.***
2. ***Sweeping.***
3. ***RANGE, 2900.***

Executed as explained for zone fire without sweeping, with the following modification: The first round of the rafale is fired with the line of sight directed on the right portion of the target or on the aiming point; before firing each of the succeeding rounds at the initial range (2900 yards), the gunner traverses the piece to the left by a full turn of the handwheel.

The sweeping at the other three ranges is executed in a similar manner, except that at the second and fourth ranges the sweeping is to the right instead of to the left, the piece being thus brought back to its original direction after the second and fourth sweeps, respectively.

259. The examples given above of commands appropriate in the cases of volley and zone fire are on the assumption that the firing data have been completely established by previous fire and that the instruments are all set at the readings last used. If this is not the case, or if it is desired to make changes in the data last used, then the necessary data are announced in the command. Thus, having fired one rafale at a target, to fire a second one at the same target, but with slightly different data, the instructor commands, for example:

(a)

1. *Volley fire.*
2. *Four rounds.*
3. *Corrector, 32.*
4. *RANGE, 2700.*

(b)

1. *Volley fire.*
2. *Sweeping.*
3. *Deflection, 2760.*
4. *RANGE, 1800.*

(c)

1. *Zone fire.*
2. *Corrector, 22.*
3. *RANGE, 3800.*

(d)

1. *Zone fire.*
2. *Sweeping.*
3. *Deflection, 2760.*
4. *RANGE, 3000.*

FIRE AT WILL.

260. This method of fire is used for the close defense of the guns. Time fire is the rule, the fuses being set at zero. If possible to foresee the necessity, a number of fuses are set at zero in anticipation of their use. Direct laying is employed.

261. The instructor commands, for example:

1. *Approaching cavalry.*
2. *FIRE AT WILL.*

The gunner sets the sight at 1,000 yards; No. 3 sets the fuse setter scales at zero range, and corrector 30; the piece is promptly loaded and laid. At the instructor's command: *Commence firing,* the gunner commands: 1. *Ready,* 2. *FIRE;* at the second command, No. 1 fires the piece. The operation of setting fuses, loading, laying, and firing are then carried on continuously, the command for firing being given by the gunner as soon as the piece is loaded and laid. The firing is continued until the instructor commands: *Cease firing,* or until the target disappears from view or actually reaches the gun. In the latter event the cannoneers shelter themselves behind the carriages and defend themselves with the pistol.

262. With fuses set at zero, an elevation of the piece corresponding to a range of about 1,000 yards gives the most favorable distribution of the shrapnel bullets, and, with fuses thus set, accurate laying is not essential; it is sufficient to keep the gun pointed roughly at the target by the use of the peep sight. Such fire is effective up to about 500 yards from the gun.

Against a slowly moving enemy, such as infantry, the fire should be commenced when he has arrived within about 500 yards of the gun; against a rapidly moving enemy, such as cavalry, when he has arrived within about 1,000 yards; the purpose, in both cases, being to surely establish a fire-swept zone through which the enemy must pass in order to reach the guns.

Moving Targets.

263. Direct laying is the rule. The instructor commands, for example:

1. *Moving target, that squadron of cavalry.*
2. *Deflection, 10.*
3. *Corrector, 27.*
4. *RANGE, 2400.*

The gunner causes No. 2 to direct the piece upon the head of the target, or, if the target is moving across the plane of fire, then somewhat in front of it; in the latter case the gunner first traverses the muzzle as far as possible in the direction opposed to the movement of the target.

The piece is loaded and laid as prescribed in paragraph 236. As soon as the line of sight is brought on the target the gunner commands *ready*, but continues to keep his gun laid on the target until the command *fire* is given by the instructor.

As soon as the piece has been fired the gunner resumes following the target. If the limit of traverse is reached, he commands: 1. *Trail*, 2. *RIGHT* (*LEFT*), causes the piece to be directed ahead of the target, and traverses the muzzle to the opposite limit of traverse.

The instructor causes other single rounds to be fired by announcing such changes in the data as may be necessary, and by giving the command for firing.

264. To employ volley fire or zone fire, the instructor commands, for example:

1. *Volley fire.*	1. *Zone fire.*
2. *Five rounds.*	2. *RANGE, 3000.*
3. *RANGE, 2500.*	

At the instructor's command, *commence firing*, the fire is executed as described in paragraph 254 or paragraph 256, the gunner keeping the line of sight directed upon the target, and the operations of loading, laying, and firing being carried on continuously and rapidly until the required number of rounds has been fired.

265. In the attack of large moving targets, indirect laying may be employed. The procedure is then only a special application of ***changing targets*** (par. 245). The B. C. telescope is used. It is sighted on the aiming point at zero deflection, and the lower limb of the instrument clamped; the upper limb is then swung around upon the target, or, if the target is moving across the range, the telescope is directed at a sufficient angular distance ahead of the target to allow time for loading and laying the piece. The piece is sighted on the aiming point with the deflection at which the telescope is set, corrected for the distance from telescope to gun and for the movement of the target; just before the target appears on the vertical cross hair in the field of view of the telescope, the command for firing or for commencing the fire is given by the instructor.

The telescope is then set ahead in deflection by an amount depending upon the rate of travel of the target, and the piece is laid and fired as before.

266. The travel of the target during the time of flight involves variations in range and deflection. Corrections for range due to time of flight are unnecessary. Corrections for deflection made according to the following rule will be found sufficiently exact:

RULE.—If the line of travel of the target makes an angle greater than 45° with the line of fire take 5 mils deflection, if the target is moving at a walk; 10 mils, if moving at a trot; 15 mils, if moving at a gallop. If this angle is less than 45° and greater than 15°, take one-half of the foregoing deflections. For angles less than 15° make no correction.

If the target is moving to the left, add the correction; if to the right, subtract it.

267. As targets will ordinarily remain exposed to view in the open but a short period of time, great skill in serving the piece and a high order of fire discipline are required to attain quickly an effective fire upon such targets. The squad is accordingly frequently practiced in simulated fire at targets moving at various angles to the plane of fire and at different rates of speed. Mounted detachments, the caissons of a battery, or any vehicles which happen to appear on the terrain may be utilized for targets. The squad is practiced in getting the gun quickly directed upon a suddenly appearing target, in following its movements, and in keeping up a continuous fire, the instructor prescribing the method of fire and announcing such changes in the firing data as may from time to time be necessitated by the movements of the target.

Service of the Piece with Reduced Numbers.

268. In order to accustom the squad to maintaining the service of the piece when its strength is reduced by casualties in action, the instructor causes certain cannoneers to fall out and assigns their duties to the cannoneers who are retained, as follows:

Cannoneers retained.	Distribution of duties.				
	G	1	2	3	4
G, 1, 2, 3, 4	G	1	2	3	4,5
G, 1, 2, 3	G	1	2	3,4,5	
G, 1, 2	G	1	2,3,4,5		
G, 1	G,1	2,3,4,5			

CHAPTER IV.—THE FIRING BATTERY.

SECTION I.—*General provisions.*

269. 1. ***The firing battery*** comprises the guns and caissons of the first five sections of the battery, with the personnel and animals assigned to their immediate service. It is under the direct command of the captain.

The instruction of the firing battery is carried on both in the battery park and during mounted exercises over all forms of terrain available. In this instruction the captain is assisted by such officers, noncommissioned officers, and men as he may assign for the purpose.

2. The formations, dispositions, exercises, and duties in the service of the piece prescribed for a single squad apply, with obvious modifications, to the firing battery.

3. The guns and caissons are unlimbered and placed in line, the carriages of each section being arranged as prescribed in

paragraph 217. The interval between the wheels of adjacent pieces is seventeen yards. If the caissons of the fifth section are present, one is unlimbered on each flank of the battery either on the line of the guns at seventeen yards interval from the nearest piece, or in rear of the line under cover, as the captain may direct. The limbers are posted as prescribed in paragraphs 218 and 219.

4. For instruction of the firing battery in the park, the battery is marched to the park and there formed into gun squads.

SECTION II.—*Duties in general of officers and noncommissioned officers.*

270. ***Captain:***

Commands the battery, and, as a rule, conducts the fire.

Senior lieutenants:

1. Command platoons.
2. Supervise the service of their guns.
3. Make sure that the guns are laid on the proper target.
4. Distribute the fire in direct laying, by assigning to each gunner his special part of the target.
5. Make minor changes in deflection so as to bring the points of burst on the target, in direct laying; to their proper relative place in the sheaf, in indirect laying (par. 286).

Reconnoissance and signal officer:

1. Determines firing data.
2. Supervises the work of scouts and auxiliary observing parties.
3. Assists the battery commander in watching the battlefield and noting changes in the tactical situation.
4. Attends to the maintenance of communication.

Junior lieutenant:

1. Commands the reserve.

First sergeant:

1. Assists the captain.
2. Posts the limbers when they take position under cover.
3. Keeps the captain informed as to ammunition supply, take charge of the removal and replacement of empty caissons.
4. Has general charge of the replacement of casualties.

Sergeants:

1. Command sections.
2. Supervise the service of their guns, watching carefully that sights, quadrants, and fuses are properly set.
3. Chief of fifth section ordinarily has charge of battery commander's telescope; sets it up and assists in using it.

Gunners:

Perform the duties prescribed in The Cannoneer and The Gun Squad.

Caisson corporals:

1. Act as relief for gunners;
2. Perform the various duties assigned them as range finders, scouts, etc.

Posts: The specific posts of the various officers and noncommissioned officers are as prescribed in The Battery Mounted (par. 559). During the instruction they post themselves where they can best perform the duties assigned them.

SECTION III.—*Methods of obtaining distribution of fire.*

Individual Distribution.

271. ***Individual distribution*** is obtained by assigning to each gunner a definite part of the target to attack. Direct laying is always employed.

If the target has clear and well-defined limits, then each chief of platoon, without special indication from the captain, assigns to each of his guns that portion of the target corresponding to its relative position in the battery. He indicates clearly to the gunner the part of the target on which he is to lay.

If the target has ill-defined limits, the captain first explains to the chiefs of platoon the exact front which the battery is to attack.

Collective Distribution.

272. ***Collective distribution*** is obtained by assigning a common aiming point to the pieces and giving them deflections which vary from right to left in regular progression. The fire may thus be distributed to any degree desired by the captain. Indirect laying is always employed.

The right piece is given a deflection such that, when its line of sight is directed upon the aiming point, the piece will be directed on the right section of the target. This deflection is increased (or diminished) for each of the other pieces by a correction which, applied in arithmetical progression, will cause the fire to be evenly distributed over the front of the target assigned to the battery.

This correction is called the ***deflection difference.*** Its determination is explained in paragraphs 426–433.

273. When a common aiming point is used, the right piece is habitually taken as the directing piece. Methods of determining the deflection necessary to direct the fire of this piece upon the right section of the target are explained in paragraphs 434–439.

274. The lines of fire of the several pieces thus collectively directed are called the ***sheaf of fire.*** By announcing the deflection of the right piece and the deflection difference the initial data for forming the sheaf are furnished.[a]

To ***shift the sheaf,*** the captain announces a new deflection for the right piece, and, if he does not desire to change the distribution, the old deflection difference. Or, he may command, for example: "***Add 5,***" "***Subtract 20,***" etc., in which case each piece increases or diminishes its deflection by the amount stated.

To vary the distribution only, the captain announces the old deflection of the right piece and a new deflection difference. Or, he may command, for example: "***Fourth piece, add 10;***" "***First piece, subtract 5,***" etc.

275. ***Example 1:*** The deflection of the right piece is determined as 2980, and the deflection difference as ***plus*** 10.

The captain commands: 1. ***Deflection 2980;*** 2. ***Increase by 10.***

The right piece (No. 1) is given deflection 2980.

The right center piece (No. 2) is given deflection 2990.

The left center piece (No. 3) is given deflection 3000.

The left piece (No. 4) is given deflection 3010.

The line of sight of each piece is then brought on the common aiming point.

Example 2: The captain desires to shift the sheaf 20 mils to the right and to close the sheaf slightly.

He commands: 1. ***Deflection 2960;*** 2. ***Increase by 8.***

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[a] If no deflection difference is announced, all the pieces take the deflection which is announced.

The deflections set off are:

No. 1	2960
No. 2	2968
No. 3	2976
No. 4	2984

Example 3: The captain desires to shift the sheaf upon a target 100 mils to the left of the target considered in the last example and to keep the same distribution.

He commands: ***"Add 100."***

The deflections set off are:

No. 1	3060
No. 2	3068
No. 3	3076
No. 4	3084

Example 4: The captain desires to open out the sheaf quickly from the center.

He commands: ***"First piece, subtract 10;" "Second piece, subtract 5;" "Fourth piece, add 5."***

The deflections set off are:

No. 1	3050
No. 2	3063
No. 3	3076
No. 4	3089

SECTION IV.—*Communication of firing data to the guns.*

276. The firing data comprise:

(For direct laying.)	(For indirect laying.)
1. The deflection.	1. The deflection of the right piece.
2. The corrector.	2. The deflection difference.
3. The range.	3. The angle of site.
	4. The corrector.
	5. The range.

277. In addition to the firing data, there must be communicated to the guns:

1. The target, or aiming point.
2. The method of laying.
3. The method of fire.
4. The projectile to be used.

278. The foregoing information will habitually be communicated in the following order:

1. ***Indication of target or aiming point, and method of laying.*** Thus: "Target, that battery" (direct laying), or "Aiming point, that steeple" (indirect laying).

2. ***Method of fire.*** Thus: "By battery from the right" or "Volley fire."

3. ***Deflection, and deflection difference.*** Thus: "Deflection, 5," or "Deflection, 3390, Diminish by 5."

4. ***Angle of site:*** Thus: "Angle of site, 315."

5. ***Kind of projectile:*** Thus: "Corrector 25" (indicating time shrapnel) or "Percussion shrapnel" or "Shell."

6. ***Range:*** Thus: "Range, 3000."

279. Before the commencement of the fire, the foregoing information, or such of it as is necessary in the particular case, must be communicated to the guns. But during the progress of the fire those elements which are to remain unchanged are not repeated from command to command; except that—

1. In all methods of fire, except ***fire at will,*** the range is always announced as the indication that all changes in the data have been made, and that the guns should be loaded.

2. In ***volley fire*** and ***zone fire*** the command ***volley fire*** or ***zone fire*** is given for each rafale; and in ***volley fire without sweeping*** the number of rounds is always stated.

280. The firing data and other information may be—

1. Announced as a command.
2. Communicated to the assembled gunners.

281. ***First:*** When announced in the command, the chiefs of platoon announce the deflection for each of their pieces as soon as the captain has announced the deflection and the deflection difference.

The captain announces, for example:

Deflection, 4730;
Increase by 5.

The chief of the platoon on the right announces:

Deflection No. 1, 4730;
No. 2, 4735; and

The chief of the platoon on the left announces:

Deflection No. 3, 4740;
No. 4, 4745.

The other elements of the firing data are repeated by the chiefs of platoon, item by item, as they are announced by the captain.

If the target or aiming point can not be clearly designated in the command, the captain directs: ***Chiefs of platoon report.*** They hasten to the captain, receive the necessary information, return to their platoons and, calling their gunners to them, point out the aiming point or that part of the target at which each gunner is to fire.

282. ***Second:*** When time admits, the captain directs: ***Report for firing data.*** The chiefs of platoon and of section and the gunners—the latter carrying their panorama sights—hasten to the captain and form in line facing him in the order of the pieces from right to left, the gunners on the right and left of their chiefs of platoon, the chiefs of section in rear of their gunners. The captain points out the target or aiming point, designates the method of fire, the method of distribution and the projectile to be used, and gives such other instructions as he may desire.

In the case of collective distribution, he announces the deflection of the right piece and the deflection difference. The gunners call off at once, in order from right to left, the deflections pertaining to their respective pieces, and immediately set their sights accordingly.

The captain commands, for example:

Deflection, 2630;
Diminish by 10.

The gunner of the right piece announces and sets 2630.
The gunner of the right center piece announces and sets 2620.
The gunner of the left center piece announces and sets 2610.
The gunner of the left piece announces and sets 2600.

At the captain's command ***posts,*** the chiefs of platoon and of section and the gunners return to their posts; the instruments are set, and the pieces laid as far as practicable with the information furnished.

The captain may also direct that the pieces be loaded.

283. The captain always gives the command or signal for firing or commencing the fire. If given by word of mouth, the command is: ***Commence firing.***

The signal for firing or commencing the fire is made as follows: Raise the hand to the height of the forehead; then make an energetic gesture of the hand upward and outward, fully extending the arm, and quickly drop the hand to the side.

The captain gives the command or signal so that the fire will commence at the desired moment. He may give it immediately after announcing the necessary firing data, or after an interval, if the circumstances so require.

The captain having given the command or signal for firing, the command of execution, except in the case of salutes, is then given by the chief of section or the gunner, as the case may be.

The chief of section gives the command of execution in ***continuous fire*** and in all cases of fire ***by battery, by platoon,*** or ***by piece.*** Thus: 1. ***No. 1*** (or such number); 2. ***FIRE.***

The gunner gives the command of execution for firing in ***volley fire, zone fire,*** and ***fire at will.*** Thus: 1. ***Ready;*** 2. ***FIRE.***

In those cases in which the gunner gives the command of execution, the chief of section, at the captain's command or signal ***commence firing,*** cautions ***"commence firing."***

In the case of salutes the captain gives the command of execution. Thus: 1. ***No. 1*** (or such number); 2. ***FIRE.***

SECTION V.—*Fire for adjustment and fire for effect.*

284. ***Fire for adjustment*** has for its principal object the determination or verification of the firing data.

Fire for effect has for its sole object the destruction of the target.

Fire for Adjustment.

285. The captain adapts his method of adjustment to the circumstances of the particular case with which he has to deal. The nature of the target, the facilities for observation of fire, the possibility of producing great effect by a rapid method of fire, and the husbanding of ammunition, are all considerations which enter into the matter.

Either time or percussion fire may be employed. That kind is generally used which is to be used in the subsequent fire for effect.

If ***sweeping*** is to be employed in the subsequent fire for effect, the adjustment is secured without sweeping, each piece being directed upon the right portion of its target. If observation of fire will be assisted, however, the fire may be converged until the adjustment in range is secured, and then diverged to adjust the distribution.

The following are the methods of fire usually employed in adjustment:

1. *By battery salvo.*
2. *By platoon salvo.*
3. *By piece.*

286. *By battery salvo:*

The captain commands, for example:

(Direct laying.)	(Indirect laying.)
1. *Target, that line of infantry.*	1. *Aiming point, that stone monument.*
2. *By battery from the right.*	2. *By battery from the left.*
3. *Deflection, 10.*	3. *Deflection, 3650.*
4. *Corrector, 28.*	4. *Diminish by 15.*
5. *RANGE, 3000.*	5. *Angle of site, 310.*
	6. *Corrector, 27.*
	7. *RANGE, 3300.*

The pieces are loaded and laid as prescribed in paragraph 236 or paragraph 237.

As each gunner commands *ready,* his chief of section faces the captain and raises the right hand.

When the captain sees that all the pieces are ready, he commands or signals: *commence firing.*

The chief of section on the indicated flank commands: 1. *No. 1* (*No. 4*); 2. *FIRE.*

The pieces are fired in turn from the flank indicated by command of their chiefs of section, the intervals between the shots being about three seconds.

The captain observes the group of bursts and estimates quickly the corrections necessary. He makes the necessary corrections in range and height of burst. In indirect laying, he also modifies the direction of the sheaf and the deflection difference, so as to cause the fire to be directed and properly distributed upon the target.

The chiefs of platoon, in direct laying, make the minor changes in deflection necessary to bring the line of fire of each of their guns upon its target, and in indirect laying, to bring the line of fire of each gun to its relative place in the sheaf. If the chiefs of platoon can not see the burst of shots, the captain makes the corrections in deflection.

287. For succeedings salvos, the captain commands, for example:

(Direct laying.)	(Indirect laying.)
1. *Corrector, 23.*	1. *Deflection, 3630.*
2. *RANGE, 3000.*	2. *Diminish by 15.*
	3. *RANGE, 3700.*

Or, he makes such other corrections as may be necessary. The pieces are loaded, laid, and fired as before.

288. When the fire for adjustment is to be by platoon or piece, the captain designates beforehand the platoon or piece to be used for this purpose. Thus: *Right platoon the adjusting platoon;* or, *Left piece the adjusting piece.* In the case of indirect laying, the right platoon or right piece is usually designated. The pieces which do not take part in the fire for adjustment are kept laid with the firing data last announced, and all preparations are made by them to take up the fire as soon as the adjustment is completed. Before passing to fire for effect a *verifying salvo* is usually fired by all the pieces which are to take part in the fire for effect.

If a verifying salvo by all the guns has not been fired, or if the caution "*All the guns*" is not given, then only those guns participate in the fire for effect which have been used in securing the adjustment.

289. *By platoon salvo:*

The captain commands, for example:

(Direct laying.)	(Indirect laying.)
1. *Target, that machine gun.*	1. *Aiming point, that smokestack.*
2. *By platoon from the left.*	2. *By platoon from the right.*
3. *Deflection, 6395.*	3. *Deflection, 4860.*
4. *Corrector, 28.*	4. *Increase by 5.*
5. *RANGE, 2500.*	5. *Angle of site, 290.*
	6. *Corrector, 28.*
	7. *RANGE, 3700.*

The pieces of the designated platoon are loaded and laid. As each gunner commands *ready,* his chief of section faces the captain and raises the right hand. When the captain sees that both pieces are ready, he commands or signals: *Commence firing.* The pieces of the designated platoon are then fired in turn from the indicated flank, as explained in paragraph 286.

The captain observes the burst of the shots and announces such changes in the firing data as may be requisite for the succeeding fire.

290. *By piece:*

The captain commands, for example:

(Direct laying.)	(Indirect laying.)
1. *Target, that gun pit.*	1. *Aiming point, that flagstaff.*
2. *Deflection, 0.*	2. *Deflection, 1770.*
3. *Shell.*	3. *Angle of site, 305.*
4. *RANGE, 2900.*	4. *Percussion shrapnel.*
	5. *RANGE, 4000.*

When the designated piece is ready, its chief of section faces the captain and raises the right hand. At the command or signal from the captain, the piece is fired by command of the chief of section.

After observing the burst, the captain announces the necessary changes in the firing data for the next shot.

291. Salvos *by battalion* or *by regiment* may be fired by commands and means similar to those prescribed in paragraph 286.

Fire for Effect.

292. The firing data having been verified to the extent required by the circumstances, the captain passes to *fire for effect.* He employs the method of fire best adapted to the circumstances of the case with which he has to deal.

The usual methods of fire for effect are:

1. *Continuous fire.*
2. *Volley fire.*
3. *Zone fire.*

An exceptional method of fire is:

4. *Fire at will.*

Continuous fire:

293. In continuous fire the pieces are fired in regular order from one flank of the battery to the other, at such intervals of time as the captain may designate, and the fire is kept up until he orders its cessation. If the order of fire has been established by previous fire, the same order is maintained. If it has not been thus established, the fire is from right to left, unless the captain cautions *from the left.*

294. To fire *without sweeping,* the captain commands, for example:

1. *Continue the fire.*
2. *Interval, 15 seconds.*
3. *RANGE, 2700.*

Each chief of section faces his chief of platoon when his piece is ready, and at the latter's signal gives the command for firing. The chiefs of platoon cause the pieces to be fired in the appropriate order at the interval given in the command. As soon as fired each piece is at once loaded, laid, and made ready for the next round.

The captain observes the fire and makes such changes in the firing data as may from time to time be necessary.

295. To fire *with sweeping,* the captain commands, for example:

1. *Continue the fire.*
2. *Sweeping.*
3. *Interval, 20 seconds.*
4. *RANGE, 4250.*

Executed as in paragraph 294, except that between the successive shots of each piece its direction is shifted as explained in paragraph 243e.

296. *Volley fire.*

A *volley* or a *volley sweeping,* consists in the discharge by each piece of a specified number of rounds, fired as explained in paragraphs 254 and 255.

297. To fire a volley *without sweeping,* the captain commands, for example:

1. *Volley fire.*
2. *Three rounds.*
3. *RANGE, 3100.*

The pieces are at once loaded and laid for the first round. Each chief of section, as soon as he has satisfied himself that any changes ordered in the firing data have been made, looks toward the captain and at the latter's command or signal *commence firing,* cautions: *Commence firing.* Each gunner then proceeds to fire the number of rounds specified in the command, as explained in paragraph 254.

298. To fire a volley ***with sweeping,*** the captain commands, for example:

1. ***Volley fire.***
2. ***Sweeping.***
3. ***RANGE, 3500.***

The pieces are at once loaded and laid for the first round. At the captain's command or signal ***commence firing,*** the chiefs of section caution: ***Commence firing,*** and each gunner fires three rounds sweeping as explained in paragraph 255.

299. Subsequent volleys are fired by similar commands and means. If the captain desires to make changes in the firing data from volley to volley, he announces the new data in the commands.

300. If the target has little depth and its range has been accurately determined, several volleys may be fired at this range; the fire is then said to be ***by volleys at a single range.***

If, however, the target has considerable depth, or if the range has not been accurately determined, the area within which the target has been located may be searched by progressively increasing or diminishing the range from volley to volley; the fire is then said to be ***by volleys at successive ranges.*** The range difference between volleys is determined by the captain according to the circumstances of the case; it is usually 100 yards.

Zone fire:

301. A single rafale of zone fire consists in the discharge by each piece of eight or twelve rounds, as explained in paragraph 256.

302. To fire ***without sweeping,*** the captain commands, for example:

1. ***Zone fire.***
2. ***RANGE, 3000.***

The pieces are at once loaded and laid for the first round. Each chief of section, as soon as he has satisfied himself that any changes ordered in the firing data have been made, looks toward the captain, and at the latter's command or signal ***commence firing,*** cautions: ***Commence firing.*** Each gunner then proceeds to fire the eight rounds as described in paragraph 257. As soon as the second round at each range has been passed, the chief of section cautions the new range.

Subsequent rafales are fired by similar commands and means, the captain making such changes in the firing data as he deems necessary.

303. To fire ***with sweeping,*** the captain commands, for example:

1. ***Zone fire.***
2. ***Sweeping.***
3. ***RANGE, 4000.***

The pieces are at once loaded and laid for the first round. At the captain's command or signal ***commence firing*** the chiefs of section caution: ***Commence firing,*** and each gunner fires the 12 rounds as explained in paragraph 258.

As soon as the third round at each range has been passed, the chief of section cautions the new range.

304. ***Fire at will.***

When this method of fire is ordered, each piece executes a rapid individual fire, as explained in paragraph 261. Each piece is laid on the part of the target opposed to it.

The captain commands, for example:

1. ***Approaching infantry.***
2. ***FIRE AT WILL.***

The chiefs of section look toward the captain, and at his command or signal ***commence firing,*** they caution: ***Commence firing.*** The gunners then proceed with rapid individual fire, as explained in paragraph 261.

Chiefs of platoon and section are careful to see that fuse setters are set at corrector 30 and zero range.

MOVING TARGETS.

305. The pieces may be directed upon a zone which it is evident the target will have to cross and upon which the fire has been previously adjusted. In this case, they are made ready for firing by volleys or by zone fire, as may be most suitable, the fire being opened at the captain's command or signal ***commence firing,*** as the target draws near to the selected zone.

306. To adjust the fire upon a target in motion, salvos or volleys are used, depending upon the nature of the target and the speed and direction of its movement. For large, slowly moving targets and for all targets moving parallel to the line of fire or nearly so, salvos are, in general, preferable. For targets moving rapidly across the range, volleys may be more desirable.

The fire for effect is by volley fire or zone fire, as may be most suitable.

SECTION VI.—*Change of target.*

307. A change of target is executed by the battery as explained for a single piece in paragraph 245, the new firing data being communicated as in paragraph 280.

The chiefs of platoon see to it that the pieces are quickly directed upon the new target. If the new target is at such an angular distance from the old as to make firing from the old line dangerous, the pieces are moved by hand under direction of the chiefs of platoon so as to establish a line normal to the new direction. This movement is generally pivoted on one of the center pieces. As soon as their pieces are directed on the new target, the chiefs of platoon report: (***Such***) ***platoon, on the target.***

308. If circumstances require it, the captain may command, for example: 1. ***No. 1*** (***or such number***), or 1. ***Right*** (***or such platoon***), 2. ***CHANGE TARGET.***

In this case only the indicated piece or platoon changes its direction.

SECTION VII.—*Replacement of ammunition.*

309. The ammunition chests of the firing battery should, if practicable, always be filled before occupying a position.

If a position is prepared for occupation for a considerable time, spare rounds may be brought up from the limbers or the reserve and stored at suitable places near the guns.

The caissons of the gun sections are ordinarily refilled, during lulls in the action, from the caissons of the fifth section, which are placed on either flank of the battery. When empty these caissons are withdrawn and replaced by caissons from the reserve. If necessity requires, the caissons of the gun sections may be replaced directly by caissons from the reserve.

The caissons of the gun sections may also be refilled from the limbers of the firing battery. The latter are refilled from the caissons of the reserve at the first opportunity.

Empty caissons of the reserve are sent without delay to the ammunition column to be refilled.

Movements of the carriages are habitually made under cover, if possible, and during lulls in the action.

310. *Replacement from caissons of the fifth section:* The captain commands: *Draw ammunition from the fifth section.* The chiefs of section and cannoneers of each platoon hasten to the caisson which is on the flank of their platoon. The gunner remains with the caisson of his section. The chiefs of the right and left sections in each platoon place themselves in rear of the right and left sides, respectively, of a flank caisson; their cannoneers form in single file behind them and receive from them in turn two cartridges each, which they take to their sections and turn over to the gunner. The gunner puts the cartridges in the chest.

Cannoneers present with the fifth section caissons assist in carrying the ammunition, under direction of the nearest chief of platoon. The chiefs of platoon supervise the replacement of ammunition and command: *Posts,* as soon as it is completed.

311. *Replacement from the limbers:* The captain, if necessary, first causes the limbers to be brought to a convenient position near the guns, and then commands: 1. *Draw ammunition from the limbers.* The ammunition is drawn for each section from its own limbers, in a manner similar to that above described. The ammunition in the gun limbers is ordinarily maintained as a last reserve.

SECTION VIII.—*Replacement of casualties.*

312. Firing instruction is frequently practiced with reduced personnel, certain officers, noncommissioned officers, and men being directed to fall out as representing casualties in action. If the captain does not give special instructions as to the replacement of these individuals, the following obtains:

The captain is replaced by the senior lieutenant.

A platoon commander is replaced by his senior chief of section.

A chief of section is replaced by a sergeant from the reserve.

A gunner is replaced by a caisson corporal, or temporarily by his chief of section.

The cannoneers of a gun squad perform additional duties, as prescribed in paragraph 268, until cannoneers can be brought up from the reserve.

The first sergeant has general charge of the replacement of casualties among the enlisted men, and summons men from the limber or the reserve when necessary.

In action, if casualties become excessive, the service of certain guns may be discontinued and the cannoneers sent to assist at others, so as to have at least a gunner and two men for each piece in action. But the piece may be loaded, laid, and fired by one man, and the fire of the battery must not be abandoned as long as there are men to serve any of its guns.

CHAPTER V.—PREPARATION AND CONDUCT OF FIRE.

SECTION I.—*Preparation of fire.*

1. POSITIONS.

313. Positions are defined as ***masked*** or ***unmasked,*** according as they afford concealment or not.

When no concealment is afforded, the guns are said to be in an ***unmasked position,*** and the fire is referred to as ***unmasked fire.***

When concealment is afforded, the guns are said to be in a ***masked position,*** and the fire is referred to as ***masked fire.***

The degree of concealment varies. Thus:

(*a*) If the guns are posted so that through the sights the hostile position can just be seen over the mask, they are said to have ***sight defilade;***

(*b*) If they are posted where a dismounted man can just see the hostile position over the mask, they are said to have ***dismounted defilade;***

(*c*) If where a mounted man can just see the hostile position over the mask, to have ***mounted defilade;*** and

(*d*) If so that the flash of the gun will be concealed, to have ***flash defilade.***

314. The hostile position against which we defilade may be the target to be attacked; preferably, however, defilade is taken against the highest position which the enemy's observing parties can occupy.

315. Positions are described by the foregoing terms; thus a battery commander may be told to take a position for ***masked fire, flash defilade.***

316. A defilade of 4 yards is sufficient to conceal the flash of the gun. A defilade greater than this is still referred to, however, as ***flash defilade.***

If the position is on a reverse slope and the slope is fairly uniform, defilade of 4 yards may be quickly obtained as follows: Post a dismounted man and a mounted man covering each other, the first in the position of dismounted defilade, the second in that of mounted defilade; then post the guns in rear of the mounted man a distance slightly greater than the distance separating him from the dismounted man.

317. Artillery may be posted for ***immediate action, in observation,*** or ***in readiness.***

When posted for ***immediate action*** the guns are unlimbered and fire is opened as promptly as possible upon the indicated targets. The position may be masked or unmasked.

When posted ***in observation*** the guns are unlimbered and all preparation made for opening at the desired moment upon the existing or expected targets. The positon is usually masked.

When posted ***in readiness*** the guns are not unlimbered. They are held under cover near a position for possible immediate action, but so that they can be moved quickly to another locality if the development of the tactical situation so requires. In the meantime the immediate tactical situation is studied, positions in the neighborhood for posting the guns to meet different eventualities are selected, and preparations are made for occupying the selected positions and for promptly opening fire upon the existing or expected targets.

2. *DUTIES OF OFFICERS.*

318. Due to the extensive use of cover brought about by the efficiency of modern firearms, the targets of artillery are apt to be concealed from view a great part of the time, and, when visible, to remain so but a short time. To find out where the enemy is and to secure the information which will enable the guns to open prompt and effective fire have hence become duties of the first importance. ***Before the commencement of the action and through all its phases*** this information must be sought. Preparation must be made on the tactical side for posting the guns where they will be most effective, and on the technical side for securing the data which will permit fire to be promptly opened on all the positions in which the enemy is known to be or which he is expected to occupy.

Duties devolving upon officers prior to and during an action are set forth in Part VI. Those duties which particularly affect the technical preparation of fire are especially emphasized here.

319. The higher artillery commanders are concerned especially—

1. To procure by all possible means definite information as to the position of the enemy, or as to the positions liable to be occupied by him.

2. To select positions for the different units of artillery and cause reconnaissance officers to determine the necessary firing data for these positions.

3. To assign each unit its particular duty or task, designating, when appropriate, those units for ***immediate action*** and those to take position ***in observation*** or ***in readiness.***

4. To formulate clearly in their minds the terms or methods which they will employ in the designation of objectives (targets, aiming points, registration marks, etc.).

5. To provide each subordinate commander and to keep him provided with all available information, technical and tactical, which will assist him in the performance of his duties.

For this purpose to organize the service of information and communication so that information as to positions and movements of the enemy and of our own troops may, on the one hand, be quickly obtained and, on the other, be quickly transmitted.

320. Battery commanders are concerned especially—

1. To examine the target assigned and endeavor to determine clearly its ***nature,*** its ***extent,*** and its ***relation*** to surrounding objects.

2. To study the terrain in the neighborhood of the target; locate, if possible, any ravines, hollows, or obstructions which would hide the fall of projectiles, and decide whether it will be necessary or preferable to adjust the fire upon some particular part of the target rather than upon the whole front.

3. To decide whether the adjustment is to be by time or percussion fire, and whether by piece, by platoon, or by battery.

4. To decide upon the method of laying, selecting an aiming point if indirect laying is to be used.

5. To measure the front to be attacked and decide upon the method of distributing the fire.

6. To determine the firing data to be initially used, if the same have not been furnished him by the battalion commander or reconnaissance officer.

7. To select a suitable observing station for himself and to post auxiliary observing parties, if practicable, so that they may assist in the observation of fire.

321. The time available for the performance of the foregoing duties depends entirely upon the nature of the action. In some cases they must be performed with the utmost celerity; in others the opportunity is afforded for deliberate and complete preparation before opening fire. ***Every effort must be made to reach the position in advance of the moment for action, and thus gain the opportunity to appreciate the situation and make the necessary dispositions for the prompt opening of effective fire.***

3. *DISTRIBUTION OF FIRE.*

322. The fire of a battery is usually distributed over the front assigned it for attack. Each gun must be given the direction necessary to bring it to bear on its proper section of the target.

When time shrapnel fire is employed the following considerations are to be borne in mind:

(*a*) If the front to be attacked does not much exceed 35 yards in width, it is sufficient to converge upon the center of this front, as the dispersion of fire, when a considerable number of rounds is fired, will provide for covering the full front.

(*b*) Fronts which do not much exceed 100 yards may be covered effectively by a battery without sweeping.

(*c*) If the front much exceeds 100 yards, it may be divided up into sections and each section attacked in turn, or sweeping may be employed. The choice depends upon the nature of the target and the circumstances of the case.

323. Knowing the range to his target and its width in mils, the battery commander quickly converts this width into yards, and decides whether to employ converging fire, fire without sweeping, or fire with sweeping.

In the two latter cases he secures distribution by assigning to each gun one-fourth of the front to be attacked.

If direct laying is to be employed, he indicates clearly to the chiefs of platoon the outer limits of the target, if these limits are not in themselves obvious; and each chief of platoon points out to his chiefs of section and gunners the part of the target on which their respective guns are to be initially laid. Or, if the case admits, the captain may himself communicate this information, as explained in paragraph 282.

If indirect laying is to be employed, a distribution difference equal to one-fourth of the front in mils is used.

If the front to be attacked is approximately equal to the battery front, however, a quick method is to start with parallel fire (par. 432) and then modify the distribution, if necessary, as the fire progresses, by appropriate changes in the deflection difference.

324. The maximum front which may be attacked effectively by a battery using the normal sweep of three rounds is 200 yards.

If a larger front than 200 yards must be attacked, two methods are applicable: (1) To divide the front up into equal parts, so that no part will have a greater width than 200 yards, and attack these parts in turn; (2) to form the sheaf at the outset so that it will cover the whole front, and fire a sufficient number of rounds sweeping to cover the entire front effectively.

If zone fire is to be used, the first method is obligatory.

If continuous or volley fire is to be used, the circumstances must decide which method is preferable. If time is not afforded for deliberate preparation, the first method is usually preferable; but if time is thus afforded, then the second method may often be found advantageous.

When the second method is employed, the number of rounds to be fired in the sweep is determined by dividing by *20* the number of yards in the front assigned to each gun to attack.[a]

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[a] When the mean height of burst of shrapnel is well adjusted, each gun is expected to cover effectively a front of 20 yards if one round is fired, 25 if two are fired. One turn of the traversing handwheel shifts the point of burst by approximately 20 yards.

The construction of the carriage permits a traverse of about 70 mils on either side of the axial line.

As sweeping fire is especially adapted for use in cases when the fire has been carefully prepared for upon definite hostile positions, time may be afforded for giving the initial direction with the gun set at the extreme right traverse, if necessary. The full traverse on the carriage may thus be utilized; but it is not contemplated that a single gun will be given such a width of front to attack as to make this necessary.

In determining the number of rounds to be fired sweeping, if the quotient obtained by dividing the front assigned each gun by 20 is not exact, but consists of a whole number and a large fraction, then the next larger whole number is taken.

If the target is very oblique, different ranges may be assigned the different guns.

For examples in the distribution of time fire, see paragraph 440.

325. When *percussion fire* is employed, the nature of the target determines whether converging or distributed fire is to be employed.

If the target to be attacked has a continuous front—e. g., walls, obstacles, etc.—this front may be divided up into sections of 25 yards each, and the sections attacked in turn, each gun taking its proportionate part. If the target has a much smaller front than 25 yards, the fire may be converged upon its center. If the target consists of artillery, each gun may be assigned a corresponding gun to attack, or several guns may be converged upon each opposing gun, depending upon the amount of artillery available.

4. *DETERMINATION OF FIRING DATA.*

326. The necessary data are:

1. The deflection.
2. The angle of site (in the case of indirect laying).
3. The corrector (in the case of time fire).
4. The range.

The Deflection.

327. To overcome the effects of wind and drift, a correction in deflection may be necessary. Its amount is generally small, however, and with a little experience may be readily estimated.

The correction for drift is always additive; that for wind may be either additive or subtractive, depending upon the direction of the wind. The value of each correction is first estimated; they are then combined to secure the resultant correction.

The following rough rules may be of assistance:

1. To overcome drift, increase the deflection by 3 mils at ranges up to 3,500 yards, by 5 mils at the longer ranges.

2. To overcome a *ten*-mile cross wind, change the deflection in the appropriate sense by an amount in mils equal to the number of even thousands of yards in the range.

If the target is moving across the plane of fire, a further correction in deflection must be made to allow for the travel of the target during the time of flight. A rough rule for determining the value of this correction is given in paragraph 266.

328. When direct laying is to be used, the initial deflection setting may be fully determined by the foregoing rules.

329. When indirect laying is to be employed, there must also be determined the deflection setting which will cause each piece to be directed upon its target when its line of sight is directed upon the aiming point.

In unfavorable country it may sometimes require considerable ingenuity to direct the guns upon the target. The basis of the method to be usually employed is to select a common aiming point, determine the deflection which will cause the right piece when laid on the aiming point to be directed on its target, and the deflection difference which, applied in arithmetical progression to the deflection of the right piece, will give for each of the other pieces in turn the deflection necessary to bring its line of fire on the appropriate part of the target. The corrections for wind, drift, and movement of the target are applied with the proper sign to the deflection of the right piece.

If it is possible to direct the right piece upon its target by looking through the sight, or by occupying an elevated position in rear and looking over the line of metal, then the direction may be referred to an aiming point, as explained in paragraph 154. Or, if an observer posted near the position of the right piece can see the target, he may measure, by handbreadths, the B. C. ruler, or the B. C. telescope the angle in mils between the aiming point and target, and this may be taken as the deflection of the right piece. By taking post on a tower or ladder, by climbing trees, etc., ability to see the target may be gained.

But if the observer must be at a considerable distance from the guns, then the deflection of the right piece must be secured by measuring at the observing station the angle from aiming point to target and transforming this angle for use at the gun. Methods of effecting this transformation are described in paragraphs 435–439.

The ***deflection difference*** may be measured directly, if each gun can by any means be pointed at its appropriate part of the target. It may, however, with great rapidity and with all sufficient accuracy be computed by the method explained in paragraph 432.

330. The special advantage of a common aiming point for all the guns is that the officer conducting the fire may then most readily vary the distribution and shift the direction of his fire.

The fire having been directed upon one target, he may shift it to another by increasing the deflection if the shift is toward the left, by decreasing it if the shift is toward the right.

The change in deflection necessary for this purpose is determined by measuring by means of handbreadths or the B. C. ruler the angle in mils between the old target and the new.

331. It may often occur that, though the initial direction has been given by direct laying, yet the gunner, on account of smoke, haze, or the natural indistinctness of the target, is unable to quickly locate it after looking away. Gunners should, in consequence, be trained to always note some mark on the ground which will enable them either to find the target or to bring their guns back to the initial direction by using this mark as a registration mark (par. 348). If, however, the conditions are such as to render it probable that delay or inaccuracy will thus be occasioned, the captain should at once change from direct to indirect laying, as explained in paragraph 243.

Angle of Site.

332. If the target is visible from the position of the guns, the angle of site is measured by means of the sight and quadrant (par. 165), or by the B. C. telescope set up at the position of the guns; otherwise the angle must be measured at the observing station and transformed, if necessary, for use at the guns.

333. If the observing station is near the guns and approximately at the same level, the angle measured at the observing station is used without change at the guns.

334. If the observing station is near the guns, but at a different level, the angle measured at observing station is corrected as follows: Estimate the difference of level in ***yards*** between observing station and guns; convert this difference into ***mils*** by dividing by the number of thousands of yards in range to target,[a] and apply the result with the proper sign as a correction to the angle of site of the target as measured at the observing station.

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[a] It is sufficiently exact in the usual case to take as the divisor the whole number representing most nearly the number of thousands of yards in range. Thus 3 instead of 3.3 in the example given.

Example:

Angle of site measured at observing station ______ = 320 mils.
Estimated height of observing station ***above*** guns = 30 yards.
Range to target (measured or estimated) ________ = 3300 yards.

$$\text{Correction} = +\frac{30}{3} = +10 \text{ mils.}$$

Angle of site at guns $= 320 + 10 = 330$ mils.

335. If the observing station and guns are at different levels and also at markedly different distances from the target, the angle measured at observing station is corrected as follows: Determine the difference of level in ***yards*** between observing station and guns (L_g) and between observing station and target (L_t).[a] Determine the difference of level in yards between gun and target by taking the sum of the foregoing differences if the observing station is at a level intermediate between the gun and target, by taking their difference if the observing station is above or below both the gun and target. The result is effected with a positive sign if the gun is below the target, with a negative sign if the gun is above the target; and it is then converted into mils by dividing by the number of thousands of yards in range. Applying this correction to 300 with the proper sign we have the angle of site at the gun.

The operations to be performed in effecting this transformation are set forth in detail in the B. C. data book.

Example:

Difference of level between observing station and gun, in mils __________________ $(S_g) = -50$
Difference of level between observing station and target, in mils __________________ $(S_t) = +10$
Distance from observing station to guns, in yards _ $(BG) = 1200$
Distance from observing station to target, in yards __________________ $(BT) = 4500$
Distance from guns to target, in yards __________ $(R) = 3000$

$$L_g = -50 \times 1.2 = -60$$
$$L_t = 10 \times 4.5 = 45$$

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[a] This difference may be determined by measuring by means of the B. C. telescope the difference of level in mils, and converting this difference into yards by multiplying it by the number of thousands of yards in the distance from observing station to gun or target.

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SECTION VII

312. Firing instruct
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319. [illegible] cially—

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For [illegible] commun[illegible] ments of [illegible] be [illegible]

320. [illegible]

1. [illegible] objects.

2. [illegible] would [illegible] be [illegible] by [illegible]

3. [illegible]

4. [illegible] point [illegible]

5. [illegible] method of [illegible]

6. [illegible] or [illegible]

$$\text{A. S.}=300-\left(\frac{\frac{L_g-L_t}{R}}{1000}\right)=300-\left(\frac{-60-45}{3}\right)=300+35=335.$$

336. If a very broad target is to be attacked and it is situated on a hillside sloping sharply at right angles to the plane of fire, it will generally be necessary, in order to secure exact adjustment of the fire, to vary the angles of site by a common difference from one flank of the line of guns to the other. For a four-gun battery the value of this common difference may be determined by finding the difference in angle of site between the two flanks of the target and dividing this difference by three.

337. An error in the angle of site has the effect of raising or lowering the trajectory by the amount of this error, and hence of giving the projectile a greater or less range than that expected from the setting used on the range scales of the quadrant and the fuze setter. To bring the trajectory upon the target, the range setting must be diminished or increased. As the fuze is then set for this erroneous range and not for the true range to the target, its time of burning will be too short or too long, and consequently the projectile will burst too high or too low, as the case may be. The corrector must hence be modified in order to bring the mean point of burst to the desired height.

If the error has not been very great, it may be readily overcome by a proper use of the corrector scale; but if the error is very large, great delay may result in the adjustment of height of burst. (See Example V, par. 425.)

The importance of determining the angle of site within the smallest possible limits of error is thus emphasized.

Corrector.

338. The corrector setting should be such as will cause the mean point of burst to be about 3 mils high during fire for effect; about 1 mil high during fire for adjustment.

Corrector 30 is supposed to give the mean height of burst of 3 mils. But, due to variations in powders and fuse compositions and to the errors of the day, the most suitable corrector must be determined in each individual instance. Hence at the commencement of fire a trial corrector must be taken, and as the fire progresses this must be modified, if necessary, to secure the desired adjustment of the height of burst. This trial corrector is usually 28, or else such as previous experience with the powder charge and fuse composition suggests.

A change of 1 mil in the corrector should produce a corresponding change of 1 mil in the mean height of burst, raising it if the corrector is increased, lowering it if the corrector is decreased.

The mean height of burst having been established at one range, the corrector used should give the same mean height of burst at any other range, provided that direct laying is being used or that, in case of indirect laying, the proper angles of site are employed at the different ranges.

Range.

339. The range may be determined by means of a range-finding instrument, by the B. C. telescope and a measured base, by the use of maps, or by sound. Every auxiliary means whose use the time available permits should be employed to assist in the measurement of the range, since upon its correct predetermination success in producing prompt effect depends. In many cases, however, an officer must rely upon his own estimate of the distance. By constant practice it is possible to gain the ability to estimate distances very closely, and it is imperative that artillerymen should acquire this ability.

SECTION II.—*Conduct of fire.*

1. GENERAL PROVISIONS.

340. ***Conduct of fire*** consists in employing the technical means necessary to cause fire of the desired nature to be brought to bear upon the target.

The officer charged with the conduct of fire must be the master of the fire of his guns; must be able to turn the fire promptly upon any target at will and to regulate its intensity and distribution as circumstances require. The attainment of this condition requires complete familiarity with the weapons at his disposal, skill and quick decision in their use on the part of the officer, and thorough fire discipline on the part of the organization concerned.

341. ***Conduct of fire*** is ordinarily the function of the battery commanders, while ***fire direction*** is the function of the higher artillery commanders.

342. In the general case the higher artillery commanders assign duties to their subordinates, specifying clearly and as succinctly as possible the tasks to be accomplished by each; they exercise supervision over the expenditure of ammunition, giving such special directions as may be necessary to insure the same being used to the best advantage to meet the requirements of the various phases of the action; they assist their battery commanders by keeping them supplied with all attainable information which will aid in the adjustment or employment of fire; but they refrain from interfering in the details of conduct of fire or the service of the guns, interposing only when it is perfectly obvious to them, after careful observation of the fire, that the desired results are not being attained.

343. If it is impracticable, however, for battery commanders to observe the fire upon certain targets from a readily accessible station near the guns, then the higher artillery commanders may themselves, from a suitable station, conduct the fire of their commands, either of the whole or of the necessary fraction thereof.

Conduct of fire is facilitated in such cases by placing the guns in line at normal intervals throughout and regarding the combined batteries as a single large battery; the commands and means for the execution of fire are then similar to those prescribed for a single battery, the word ***battery*** being replaced in the commands by ***battalion*** or ***regiment,*** as the case may be. A convenient unit—for example, a flank battery—is used to secure the adjustment in range and height of burst, and by means of battalion or regimental salvos the desired adjustment in distribution is obtained.

This procedure permits the fire of a large number of guns to be adjusted with the least confusion upon a small but important target.

If the batteries are scattered, their fire may likewise be adjusted by the battalion or regimental commander; but as the fire of each must be adjusted separately, the process is much slower.

344. If the officer conducting the fire is separated from the position of the guns, the senior officer present with the guns acts as his executive, receives and transmits the firing data, and watches over the fire discipline of the command. The executive notifies the officer conducting the fire when the guns are ready to fire, and awaits his command or signal ***commence firing.***

If the officer conducting the fire and his executive are sufficiently close to each other, communication is had by megaphone; if the distance involved forbids this, visual signaling or the telephone is employed, a telephone or signal station being established near the position, from which the executive can most readily exercise his proper functions and communicate with all the elements of the command.

2. PRINCIPLES GOVERNING THE CONDUCT OF FIRE.

345. The fire of artillery comprises in principle a fire for adjustment followed by a fire for effect.

The preliminary adjustment may be dispensed with only when the necessary data have been determined by previous fire or when the range is very short.

By skillful preparation of fire, however, the time required to secure adjustment may be greatly abridged, and the ability may be gained to strike a vulnerable enemy by surprise with fire which is from the outset effective.

Fire for Adjustment.

346. Adjustments of three kinds are called for, viz:

1. In direction.
2. In height of burst (in case of time fire).
3. In range.

The adjustment in direction involves bringing the sheaf of fire to bear on the desired front of target. Modifications of ***deflection*** setting are hence called for.

The adjustment in height of burst involves the determination of a ***corrector*** setting which will cause the mean point of burst to be at the normal height.

The adjustment in range involves the determination of a ***range*** setting which will cause the mean trajectory to pass through the target, or, if this is not practicable, the range settings corresponding to the front and rear limits of a zone which surely contains the target.

347. By observing the points of burst or fall of projectiles and judging their relative positions with respect to the target, the modifications in the deflection, corrector, and range settings requisite for adjusting the fire upon the target are determined.

348. In the general case fire for adjustment immediately precedes fire for effect.

If the circumstances permit, however, advantage may be taken of lulls in the action to secure at least a rough adjustment upon localities in which the enemy is known to be or near which he is expected to appear. Such a fire is termed ***fire for registration***. The data are thus secured for opening promptly an effective fire upon an enemy appearing at or near the positions upon which the fire has been registered; by minor modifications in these data a quick adjustment on the target may be secured. The registration is usually effected upon prominent features of the terrain (termed ***registration marks***) near which the enemy is known to be or expected to appear (par. 465).

349. The adjustment is effected upon the target itself, if practicable.

In many cases, however, the target itself will not be visible to the officer conducting the fire, though its approximate position may be known. Thus the target may consist of troops concealed behind a ridge, or behind a wall or hedge, or in the edge of a village, a forest, or a field of standing grain.

Some prominent feature of the terrain in or near the enemy's known position—as, for example, a tree, a house, a mass of rock, etc.—is then selected as a registration mark, and by means of scouts, observers in balloons, or any available means, the enemy's location with respect to this mark is determined within the narrowest possible limits.

The fire is then adjusted upon the registration mark, and the area within which the target has been located is searched by the subsequent fire.

350. During the adjustment the fire may be either concentrated or distributed. If observation is difficult, concentration upon the most prominent part of the target is usually called for; if observation is easy and the front to be attacked is not great, the fire may be distributed from the beginning.

If several batteries are adjusting simultaneously upon a single broad target, then it is generally best for each to concentrate during the adjustment upon one part of its target—for example, the windward flank.

351. The choice of the projectile to be used depends upon the nature of the target and its situation.

During fire for effect time fire is, as a rule, employed against animate targets, percussion fire against inanimate targets.

352. The adjustment of the range is preferably based upon the observation of percussion bursts. If the ground in front or rear of the target or registration mark can be seen, the target must be bracketed between such bursts. If the ground can not be seen, then the target must be bracketed between low-bursting time shrapnel.

For the quick adjustment upon troops in the open, fuses may be set from the commencement of the fire, but with a corrector which will surely give low bursts and a large percentage of bursts on graze. The opportunity is thus given to observe both bursts in air and bursts on graze. The visibility of the former is little affected by the profile of the ground and the state of the soil, and, taken in connection with the latter, they enable the observer to quickly determine the irregularities of the ground in front and rear of the target. Moreover, considerable effect may be produced during the adjusting series, and, by a small change in the corrector, passage to fire for effect may be quickly effected.

353. The method of fire to be employed in the adjustment depends, also, upon the nature and situation of the target.

Against troops exposed in the open, battery salvos with time shrapnel are generally to be preferred. If such targets are of minor size or importance, however, platoon salvos may be employed.

Against troops in trenches or otherwise immobilized, against inanimate targets, and in the registration of fire, the rough adjustment is usually secured by a single platoon or even a single piece, using percussion shrapnel or shell, the fire being directed upon the most prominent part of the target or registration mark. The exact adjustment in range, and also, if necessary, in the height of burst and distribution, is then secured by salvos or continuous fire executed by all the guns which are to take part in the subsequent fire for effect.

354. Guns which do not take part in the fire for adjustment are kept laid on the target with the data last ordered, and made ready to participate instantly in the fire as soon as a command or caution affecting them is given (par. 288).

355. It may be necessary in some cases to assign special targets to certain pieces or to certain platoons. In such cases the chief of section or the chief of platoon conducts the fire of his gun or guns, unless the captain gives other instructions.

Fire for Effect.

356. Depending upon the nature of the target and upon the accuracy with which the adjustment has been secured, the fire for effect may be of two general kinds, viz: (1) ***Fire at a single range,*** and (2) ***Fire at successive ranges*** (or ***searching fire***).

357. ***Fire at a single range*** is appropriate when the firing data for the enemy's position have been determined by previous fire. Thus it is adapted to the attack of all stationary targets upon which an exact adjustment has been secured, or for the attack of moving targets as they reach a position upon which the fire has been previously registered. If the fire is properly adjusted, the necessary effect may be produced with the minimum expenditure of ammunition.

358. ***Fire at successive ranges*** is appropriate when it has been impracticable to secure exact adjustment upon the target. Due to uncertainties of observation, especially at long ranges, exact adjustment is often difficult of attainment; within the time allowed by the tactical conditions it may be impossible of attainment. In such cases the preferable course is to inclose the target within the smallest limits that can be determined with surety and reasonable promptness, and then to search the area thus inclosed by fire at successive ranges.

If possible, a 100-yard bracket is always obtained, and the fire is delivered at the short, the mid, and the extreme ranges of this bracket until the most effective range can be determined. Whatever the limits determined, however, the fire is closely observed, ranges which are evidently ineffective are rejected, and the area to be searched thus gradually reduced to the smallest possible limits.

The time required to produce the requisite effect and the expenditure of ammunition may both be greatly reduced if, by reconnaissance, the enemy's positions are well determined and if, by auxiliary observers pushed well to the front and flank, information is obtained which will assist in the adjustment of fire.

The searching of areas is never to be resorted to unless it can be definitely determined that the enemy is actually located within the area selected, and unless he would evidently exercise a material influence upon the progress of the combat if left undisturbed by fire.

3. OBSERVATION OF FIRE.

359. The officer conducting the fire should be posted where he can observe not only his immediate target, but as much as possible of the terrain liable to be assigned him to attack. Unembarrassed by details of the service of the guns, he should devote himself to observing and correcting the fire and adapting its employment to meet the requirements of the situation. He should train himself to form accurate and quick estimates and to act on them with decision and boldness.

360. To overlook ground which is invisible to the officer conducting the fire, as well as for the purpose of assisting generally in the adjustment of fire, free use is to be made of auxiliary observing parties.

361. Such parties occupy the most favorable observing stations which the conditions of the combat admit. Preferably they are as near the enemy as possible. If near the guns, they are posted usually on the flanks and in elevated positions, if possible; for example, in the tops of trees, on buildings, on artificial towers, etc.

362. Their special duties are to signal information which will assist in the adjustment of fire and to keep the artillery commander informed of movements of the targets or of our own troops which would affect the employment of fire.

363. With respect to the adjustment of fire, they indicate especially whether the range is ***short, over,*** or ***correct;*** whether the ***interval of burst*** (distance of point of burst in front of target) is too ***great,*** too ***small,*** or ***correct;*** whether the direction is ***right, left,*** or ***correct.***

If large errors in range are made, an observer on the flank of the guns will not usually be able to separate the errors in range from those in direction; in such a case the observer would ordinarily signal the direction only, as ***right*** or ***left,*** as it appears to him, and the officer conducting the fire, knowing the position of the observer, would deduce the sense of the salvo, volley, etc., in range. If the observer is to the right of the line of fire, shots striking ***short*** of the target appear to be to the ***left,*** while those striking *over* appear to be to the *right;* and vice versa if he is on the left of the line of fire.

364. With respect to movements of the enemy, the observer reports especially: If the enemy abandons his position; if he shifts to the right or left, front, or rear, to escape effective fire; if additional hostile troops enter the sector assigned to the guns.

365. With respect to our own troops, the observer makes such reports as to their movements and situation as will enable the artillery commander to best assist them with the fire of the guns.

366. Arrangements should, moreover, be made with advanced troops of the other arms for the transmission of information which will assist in the adjustment of fire and for the indication as to when fire should be commenced or discontinued.

367. Sure and definite means of communication must be established between the artillery commander, his observing parties, and advanced friendly troops. If time admits, telephone communication is provided; but visual signaling must always be relied upon to a greater or less extent.

368. For observation of fire, for study of the terrain, and for the quick recognition of objectives, good field glasses are indispensable. All officers of the artillery, chiefs of section, and scouts must be equipped with suitable glasses.

369. At the commencement of the fire it is usually best to watch for the burst of the shots with the unaided eyes, for if a large error is made the bursts may not appear in the field of view of a telescope or field glass. After the bursts have been located the glasses may be quickly brought into play, if necessay, and the relative position of the smoke with respect to the target noted.

After the fire has been approximately adjusted the points of burst are observed by the aid of field glasses or the telescope, and all the indications carefully noted which assist in the determination of their relative positions with respect to the target.

Observation of Errors in Direction.

370. Errors of direction and of distribution may be measured by means of the B. C. telescope or ruler. Small errors may usually be estimated with sufficient accuracy by eye.

The measurement or estimation of these errors may best be made when the observer is near the line joining guns and target; viewed from the flank, the error in direction is complicated with that in range.

Observation of Errors in Height of Burst.

371. The height of any particular burst may be measured by means of the B. C. telescope. The mean height of a salvo may also be estimated with considerable accuracy, if the bursts as they occur are noted with respect to the horizontal lines in the field of view of the telescope, and an average is then made. The middle line indicates the normal height of burst; the upper line twice the normal height.

The observer must also be trained to estimate by eye the height of a single burst or the mean height of a salvo.

372. When the mean point of burst is at the height appropriate during the adjustment (1 mil), from one-half to one-fourth of the shrapnel may, on account of the error of the fuse, be expected to burst on graze. Similiarly, when the mean point of burst is at the height appropriate during fire for effect (3 mils), about one-tenth may be expected to burst on graze.

A check is thus afforded on the adjustment of the height of burst, provided a considerable number of rounds fired with the same fuse-setting are observed.

373. In the accurate adjustment of time fire not only the height but also the interval of burst is important; for projectiles bursting too far in front of the target and those bursting in the air above it produce little or no effect. The interval of burst is correct when both the range and the height of burst are correctly adjusted. Indications that such is the case are: (1) That the bursts on graze bracket the target; (2) that a due proportion of the projectiles burst on graze; (3) that the mean height of burst is about 3 mils; (4) that fragments from the time bursts strike the ground both in front and rear of the target, and that the pattern made by these fragments (as revealed by the dirt and dust knocked up) is close and dense rather than greatly extended; (5) that obvious effect is produced upon the target.

If doubt exists as to the interval of burst it is best to diminish the corrector and get a group of low bursts and bursts on graze.

Observers posted well to the flank of the line of fire may be of the greatest assistance in determining and correcting errors in the interval of burst.

Observation of Errors in Range.

374. It is rarely possible from a position near the guns to estimate with any accuracy the amount of the error in range. Such estimates are usually too small, and timid and insufficient changes in the range are consequently made. Delay in adjusting the fire thus often results.

Attention should rather be concentrated on deciding whether salvos or shots are ***short*** or ***over,*** and on quickly inclosing the target with fire which is surely ***short*** and fire which is surely ***over.***

By gradually narrowing the bracket thus determined an accurate adjustment may be secured.

A salvo is termed ***short*** (—) if the majority of its bursts are short, ***over*** (+) if the majority are over, and ***bracketing*** (±) if half are short and half are over. Bursts ***at the target*** may be included either with the ***shorts*** or the ***overs,*** as the circumstances dictate.

If the bursts of a bracketing salvo occur on graze, the indication is that the range of the salvo was correct; if they occur in air, that the range was approximately correct, but somewhat too great.

If the sense of a salvo can not be definitely decided upon, it should be noted as ***doubtful*** (?) and disregarded.

The observer should train himself to decide quickly upon the sense of a salvo as ***short, over, bracketing,*** or ***doubtful.*** It may be necessary, however, to allow time for the smoke to form and reveal its relative position with respect to the target.

375. If the observer is at a considerable elevation above the target, or the target is on ground sloping toward the observer, the sense of a salvo (***short*** or ***over***) may usually be recognized readily by noting the relative position with respect to the target of bursts on graze or fragmental hits from bursts in air.

376. But if the target and its vicinity can not be seen from a superior elevation, if the ground near the target is at about the same elevation as the observer, or if the ground in front or rear of the target can not be viewed, the deductions as to the sense of the salvo are to be formed especially from the manner in which the puffs of smoke from the bursts appear with respect to the target.

377. A burst on graze causes a column of smoke and dirt to be thrown up from the ground. In the case of a shrapnel this column is relatively small and fugitive; in the case of a shell it is large and remains visible for some time.

378. A burst in air produces a ball of smoke which ordinarily remains together for some time.

The bullets and fragments from a burst in air knock up a considerable amount of dirt and dust if they strike dry soil; on wet soil splashes of mud are knocked up by the shrapnel case and large fragments. In either case valuable indications are thus furnished as to where the trajectory prolonged reaches the ground.

379. If the target is silhouetted against the smoke of the burst, the range may always be considered as ***over,*** whether the burst occurred in air or on graze.

380. If the target is obscured by the smoke of the burst,[a] the range may be considered as ***short;*** but in the case of a burst in air the burst must be low in order to warrant this conclusion.

381. If the wind is blowing up or down the range, a decision should be formed quickly as to the relative position of the smoke with respect to the target. But if the wind is blowing across the range it may be better to wait until the smoke has drifted across the front or rear of the target. To secure this latter result it may be desirable to direct the fire for adjustment at the windward flank of the target.

382. It is necessary to study carefully the ground near the target and locate ravines or hollows which might catch and hide the bursts of projectiles. The smoke from such bursts is apt to rise and reveal itself after a time, but false deductions may be drawn from it. Thus the smoke from a burst ***short*** of the target may have become so much dissipated by the time it appears that the target may be seen through it and the impression produced that the target is silhouetted against the smoke. Moreover, if a strong cross wind is blowing the smoke when it appears will probably be at some distance to the flank of the actual point of burst, and erroneous conclusions as to the direction of the salvo may thus be reached. Such false deductions may be avoided, however, if the lay of the ground is appreciated and taken into consideration.

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[a] If the target is indistinct and of about the same color as the smoke, it may be less visible against the smoke as a background than against its natural background. A burst beyond the target may, for this reason, sometimes seem to obscure the target and hence be judged *short,* when it is in reality *over.* On the other hand, some targets become very much more visible if projected against a smoke background.

383. In adjusting fire upon a crest great care must be taken to reach this crest and not be deceived by a crest parallel to the crest sought, but short of it. In rolling country such an intermediate crest is often present, and it may merge itself into the background formed by the higher ground in its rear, and hence escape detection, while, as a matter of fact, there may be a broad valley or depression between the two crests. Shots which strike on the near side of the intermediate crest may be taken as establishing the short limit of the bracket, while shots which pass over the intermediate crest, burst low or on graze in the valley between the two and are lost, may be considered to have cleared the further crest, and hence may be taken as establishing the long limit of the bracket. Such deceptions may be avoided by obtaining bursts in air on the line joining observer and the crest sought. If the ball of smoke is cut in two by the crest and the crest clearly defined against it, the shot is *over,* while if the crest is concealed by the smoke the shot is *short.* The short bursts may often serve to reveal the existence of the intermediate crest by causing the latter to be silhouetted against the smoke.

384. The existence of unexpected ravines and hollows may sometimes be deduced from the fact that while bursts in air are seen, the points of impact of the fragments with the ground are not revealed by the dust and dirt knocked up.

385. If the sun is shining, information as to the sense of bursts in air may often be obtained by observing the shadow on the ground of the ball of smoke produced by the bursts. The height of the burst and the position of the sun must, however, be taken into consideration.

386. If the sense of the burst or bursts is *doubtful,* circumstances must decide whether to repeat the salvo or round or to change the firing data for the next salvo or round.

If smoke or the fire of other batteries have interfered with observation, a salvo concentrated upon some prominent part of the target may be of assistance.

If the doubt was occasioned by the fact that the bursts were in air and high, it may be well to merely diminish the corrector for the next salvo. The sense of such salvos may often be determined, however, by observing the points of impact of the shrapnel cases.

If a salvo is lost, the projectiles have probably burst in a ravine or behind some intervening cover. If the smoke of the bursts does not rise and become visible after a few seconds, the lay of the ground will determine whether to increase or diminish the range or to merely increase the corrector so as to obtain visible bursts in air. Definite information may generally be most quickly obtained in such cases by securing time bursts just above the level of the crests or other cover.

4. *RULES OF FIRE.*

387. Due to the various causes of error, a series of shots fired with the same data will probably vary more or less in their points of burst or fall. Hence in the adjustment of fire minor changes in the firing data should not be made on the basis of the observation of single shots.

388. Single shots may serve to procure a rough adjustment. To procure a more exact adjustment, changes should be made only after observation of a group of shots fired with the same data. The position of the mean point of burst of the group with respect to the target is estimated, and such further corrections as may be necessary are made on the basis of this estimate.

Adjustment of the Direction.

389. When direct laying is employed the platoon commanders make such changes in deflection as may be necessary to bring the fire of their guns to bear upon the proper portion of the target. The direction and the distribution are thus simultaneously adjusted by the same correction.

390. When indirect laying is employed the officer conducting the fire adjusts the sheaf both in direction and in distribution.

To throw the sheaf to the right, the deflection is decreased; to throw it to the left, the deflection is increased.

To open the sheaf, the deflection difference is increased if it is positive, decreased if it is negative. To close the sheaf, the deflection difference is decreased if it is positive, increased if it is negative.

If the platoon commanders are able to observe the fire, they make such minor changes in deflection as may be necessary to cause each shot to have its proper relative place in the sheaf.

If they are unable to observe the fire, the officer conducting the fire makes these corrections.

391. To overcome observed errors in direction, the error is measured or estimated in mils and a corresponding correction in deflection is applied in the appropriate sense. The correction is habitually applied in even multiples of 5 mils until approximate adjustment in direction is secured, when a correction of less than 5 mils may, if necessary, be made.

392. In indirect laying, if the deflection of the right piece and the deflection difference as computed are not expressed in even multiples of 5 mils, it is usually sufficiently exact to express them in the nearest even multiple of 5 mils at the commencement of the fire. As the fire progresses the necessary corrections may be made according to the rule set forth in the preceding paragraph.

393. If salvos or shots are lost and it is probable that a large error in deflection has been made, as may sometimes occur in indirect laying, one or more high-bursting shrapnel fired from the directing piece will permit the determination and rectification of the error.

Adjustment of the Height of Burst.

394. Conclusions are to be formed from the observation of a group of shrapnel having the same fuse setting.

Battery salvos hence afford the quickest and most reliable means of adjusting the height of burst.

395. If the bursts of the first salvo are all on graze, the corrector should be increased by 5 mils for the next salvo, and, if necessary, still further increased from salvo to salvo by increments of 5 mils until bursts in air are obtained.

396. If the mean point of burst is too high, the mean height is estimated; its excess over *1 mil* is the error, and the corrector for the next salvo should be reduced by this amount.

397. If observation of a salvo shows that too great a correction has been applied, then for the next salvo the correction should be halved and applied in the opposite sense to the corrector setting last used.

398. If the bursts of a salvo are partly in air and partly on graze, the corrector may be kept unchanged during the adjusting series or until the observation of a considerable number of rounds has shown that too large a proportion are bursting either in air or on graze (par. 372).

399. If from one-half to one-fourth of the shrapnel have been bursting on graze during the adjusting series, on passing to fire for effect an increase of 2 mils in the corrector should raise the burst to the normal height.

400. When indirect laying is employed, an error in the angle of site will cause a corresponding and equal error in height of burst. As the cause of the latter error will probably not at first be known, it will be necessary to attempt the adjustment of the height of burst by changing the corrector, as explained in paragraphs 395 and 396. If the error in height of burst is not great, it may readily be allowed for in this way; but if it is seen that the necessary correction will exceed the limits of the corrector scale, then the total correction which has been applied to the corrector must be transferred in the same sense to the angle of site, and a return to a corrector setting near the normal must be made.

At medium ranges a change of 4 mils in the angle of site produces a change of about 100 yards in range; hence if the angle of site has to be materially altered the adjustment of the range will have to be begun anew.

The foregoing emphasizes the importance of measuring the angle of site as accurately as possible in the first place. It also shows that, when the firing data for indirect laying are passed from a battery in action to one just about to take part, not only the range, but also the corrector and angle of site which have been used with that range in securing the adjustment, must be communicated.

Adjustment of the Range.

401. The range is determined or verified by bracketing; that is, by inclosing the target between salvos or shots which, fired at a known difference of range, strike, respectively, short of and beyond the target.

If the first salvo or shot is ***short,*** the range is increased; if ***over,*** it is decreased; and salvos or shots are fired successively increased or decreased in range, as the case may be, until the target is bracketed. The change in range from salvo to salvo or shot to shot in this process of finding the first bracket is usually taken as 400 yards. Only in cases in which the range has been carefully predetermined, or in which observation is especially favorable, may a smaller change in range be safely employed.

Having bracketed the target, the size of the bracket may be successively reduced by halving the last bracket obtained; that is, by firing at the mean of the last two bracketing ranges. The extent to which this reduction in the size of the bracket should be carried is entirely dependent upon the nature of the target and the circumstances of the case.

402. If the target is surely included within the limits of the bracket finally accepted, it may be reached more or less effectively by subsequent fire. The first consideration, then, is to determine definitely that fire at a certain range is surely *short* of the target, and that fire at another and longer range is surely *over* the target. A second but very important consideration is to reduce the difference between these two bracketing ranges as much as possible; that is, to obtain the smallest bracket compatible with the circumstances of the case.

403. If, during the bracketing process, the rounds fired at a given range appear to produce effect upon the target, additional rounds are fired at that range. If obvious and unmistakable effect is then observed, and the officer conducting the fire can be sure that his guns produced it, he may accept this range as the range of the target. But if any doubt whatever exists, he should *prove* the range before accepting it. This may be done by firing salvos at ranges 100 yards less and 100 yards greater than the range in question and noting whether in each case the bursts occur in the expected sense. If doubt is occasioned by the fact that other batteries are firing at the same target, a salvo with projectiles of the opposite type from those in use by the other batteries will usually be readily recognizable.

Percussion Fire:

404. Percussion fire is principally employed for the destruction of material objects, such as walls, buildings, obstacles, artillery material, etc. Such fire is termed *fire for demolition.* An accurate adjustment in range is requisite.

For the destruction of artillery material or other targets of low relief, light field guns should habitually be approached within 2500 yards of their target.

The usual procedure is to obtain a 100-yard bracket and to fire enough rounds at the limits of this bracket to determine definitely that fire at the near limit is ***short*** and that fire at the further limit is ***over.*** One or more battery salvos are ordinariily required for this purpose. The bracket having been established, ***continuous fire*** is begun at the mid range of the bracket. If observation of a considerable number of rounds at the mid range indicates that the mean point of burst is still ***short*** or ***over,*** the range is changed by 25 yards in the appropriate sense. Changes of range of less than 25 yards should not be made.

Percussion fire is considered adjusted when it is evident that effect is being produced upon the target and when the proportion of ***shorts*** and ***overs*** is sensibly even.

Time Fire:

405. Time fire is employed for the attack on animate objects. The nature of the target and the conditions affecting observation of fire determine the limits within which the range may be found.

406. When the target consists of troops immobilized in position—as, for example, infantry in trenches, artillery in battery, etc.—a 100-yard bracket is always, if possible, obtained.

If the conditions are favorable for observation, the exact adjustment of the fire may be at once undertaken, as explained in the case of percussion fire. Before passing to fire for effect, however, salvos are fired at the mid range of the bracket for the final adjustment of the height of burst and the distribution. The fire for effect may be by continuous fire or by volleys.

But if the conditions are unfavorable for observation, it is preferable, after adjusting the height of burst and distribution, to direct the fire for effect successively at the short, mid, and long ranges of the bracket until it can be definitely determined at which range the fire is most effective. Salvos, continuous fire, or volleys may be used for the purpose.

If a 100-yard bracket can not be surely obtained, then the bracket obtained may similarly be searched by successive increments or decrements of 50 or 100 yards in the range until it can be definitely determined at which range the fire is most effective.

Time fire is considered adjusted when it is evident that effect is being produced upon the target; when the great proportion of bursts in air are short of the target and at the proper mean height; when the shrapnel cases are seen to strike at or near the target; when dust, if seen at all, is knocked up by the bullets both in front and in rear of the target; and when a due proportion of bursts on graze occur and such bursts are about evenly divided between ***shorts*** and ***overs***.

407. When the target consists of troops moving or liable to move, the smallest bracket is obtained which can be surely and quickly established, and its depth is then promptly searched by the subsequent fire.

The usual procedure in such cases is to obtain quickly by bold changes of range a large but unmistakable bracket; to narrow this bracket to 200 or to 100 yards if the conditions permit; to fire verifying salvos at the short limit of the bracket, if the height of burst and distribution have not already been adjusted during the bracketing series; and then to employ volleys or salvos at successive ranges, or zone fire to search the bracket.

408. ***Volleys*** or ***salvos*** at successive ranges may be employed to search an area of any desired depth. The range ordered for the first volley or salvo is usually that corresponding to the short limit of the bracket. The fire is then continued progressively until the opposite limit of the bracket is reached by changes of 50 or 100 yards in range from volley to volley or from salvo to salvo, the time interval between volleys or salvos being such as the officer conducting the fire may deem appropriate. A range increment (or decrement) of 50 yards is ordinarily used if a 100 bracket is established, of 100 yards if a longer bracket is established.

409. ***Zone fire*** is especially adapted to searching quickly the depth of a 200-yard bracket. It is not employed for lesser depths. If the depth to be searched is much greater than 200 yards, a second rafale is fired to extend the effect in depth. The initial range of a rafale of zone fire is usually taken as 100 yards less than the short limit of the bracket; but if the target is obviously moving away from the guns, or if, in the attack of a stationary target, it is perfectly clear from the lay of the ground that fire short of the short limit of the bracket would be wasted, then the short limit of the bracket may be taken as the initial range.

410. If the ground to be searched has a noticeable slope either to the front or rear, and indirect laying is to be employed, the angle of site will vary for different parts of the area to be searched.

In the case of zone fire a mean value of the angle of site is taken, and a corrector is used which will give low bursts at the near limit of the zone if the slope is away from the guns, and bursts slightly above the normal height if the slope is toward the guns.

In the case of volleys or salvos at successive ranges the same procedure may be employed if the area to be searched is not deep and the slope not great; but for searching long and steep slopes it is usually preferable to take the angle of site of the near limit of the area as a constant angle of site and then to vary the corrector from volley to volley or from salvo to salvo, increasing it if searching *up* the slope, decreasing it if searching *down* the slope. A change of two points in the corrector from volley to volley or from salvo to salvo will suffice in the usual case.

411. Whenever searching fire is employed it must be carefully observed with a view to securing a closer adjustment for subsequent fire. If fire at certain ranges is evidently ineffective, those ranges are rejected in the subsequent fire. If the conditions permit, the process of bracketing is resumed and a closer adjustment secured.

412. If the ground either in front or in rear of the target can not be seen, or if the target is totally masked, every effort must be made to determine as accurately as possible the distance of the target from some feature of the terrain which is visible to the officer conducting the fire, and which may be used as a registration mark for the adjustment of fire. Thus if a target is behind a crest the distance of the target from the crest line is to be determined; if the target is masked by trees and is so situated that the ground in rear of the target can alone be seen, some feature of the ground in rear of the target may be taken as the registration mark and the distance determined from it.

In such cases the fire is adjusted on the registration mark chosen and then shifted so as to search the area within which the target has been located. It is most important to have observers posted so that they can observe the fire and assist in its adjustment.

Verifying Salvos:

413. Salvos fired to verify the firing data in use, or to secure a more perfect adjustment of the fire before passing to fire for effect, are termed verifying salvos.

They are especially appropriate to fully establish the limits of a bracket; to determine definitely whether fire at a given range is really effective, as has appeared from the observation of previous but insufficient fire; to secure the final adjustment in direction, height of burst, and range, particularly in cases when only a portion of the guns have been used in the fire for adjustment.

If opportunity is afforded during the bracketing series to secure a satisfactory adjustment of the fire, verifying salvos are unnecessary, except that, in the case of a target moving toward or away from the guns, if any considerable time has elapsed since the establishment of that limit of the bracket toward which the target is moving, a salvo or salvos should be fired at the range corresponding either to that limit or to a point still farther in advance of the movement of the target for the final verification of the range before passing to fire for effect.

5. APPLICATION OF FIRE.

414. In service the fire of artillery must be adapted to meet the requirements of many and ever-varying conditions. An infinite variety of concrete problems is afforded, and each problem will have its own best solution. Great flexibility in the employment of fire is hence called for.

The Regulations set forth principles which are the bases of action and rules which may serve as guides in the average case; but the Regulations must not be looked to for ready-made solutions of the problems which arise in service. Having thoroughly mastered the principles of the Regulations and thoroughly grasped the possibilities of the gun and its equipment, an officer must so prepare himself that he will be able to recognize at once the means to be employed in any concrete case and be capable of putting these means into effect. Every latitude is allowed him in the choice of a method of fire and in its adaptation to the special case in hand. By constant practice in peace in employing fire (simulated or otherwise) to meet the requirements of a great variety of tactical situations, officers may prepare themselves to use their guns to the best advantage in war.

415. The special characteristics of the different methods of fire provided for in the text are outlined below, with some illustrations of their applicability.

416. ***Continuous fire*** is adapted especially to the demolition of material objects and to the attack of personnel inactive and more or less fixed in position and protected from fire.

The fire may be as rapid or as slow as desired, thus permitting the expenditure of ammunition to be exactly regulated to meet the requirements of the case.

Exact adjustment in range is sought; but if the conditions of observation are such as to preclude this, the smallest possible bracket is obtained and its depth searched by successive changes in the range.

417. ***Volley fire*** is adapted especially to the attack of personnel that are more or less vulnerable. The special characteristic of this method of fire is its great flexibility. The number of volleys to be fired, their range difference (if any), the number of rounds in each volley, are all in the hands of the officer conducting the fire. By suitable manipulations of the sheaf he may readily shift the fire from point to point of the terrain, as necessity may require, and by adapting the bursts of fire to meet the crises of the action he may utilize the ammunition to the best advantage.

If exact adjustment in range can be obtained, volleys at a single range are employed; otherwise volleys at successive ranges are used.

418. ***Salvos*** are adapted especially to securing the adjustment of fire. They may also be used for producing effect, and especially with the idea of obtaining at the same time additional information on which to base a more exact adjustment of the fire. They are employed at single or successive ranges, according to the principles of volley fire.

419. ***Zone fire*** is adapted especially to the sudden attack of troops moving or liable to move. The special characteristic of this method of fire is that it provides for searching a deep area with the utmost rapidity, and thus of striking the enemy before he can escape from that area. ***It is used only for the attack of important bodies of troops who must be struck at once, if at all.***

A 200-yard bracket is sought, and the rafale is usually commenced at a range 100 yards less than the short limit of the bracket. Great density of fire is thus obtained over the full depth of the bracket.

420. ***Fire at will*** is employed solely for the close defense of the guns from hostile attack. If the distant approach of the enemy is seen, then he is met by volleys, the range being successively decreased in accordance with his rate of advance and the fire being held under rigid control until the last moment; but when it is seen that a rush for the guns is imminent, fire at will should be ordered.

421. Against infantry in position and more or less protected by entrenchments the fire should be carefully adjusted. As our infantry advances to the attack the intensity of the fire should be regulated to suit the necessities of the case, being slow or ceasing entirely while the enemy is concealed or inactive, rising to great intensity when the crises of the action develop and the enemy exposes himself to meet them. Continuous fire is indicated for the ordinary phases of the action, volleys for the crises, the object being to assist our own infantry: by inflicting as much damage as possible upon the enemy; by destroying his morale; by forcing him to keep under cover; and by preventing effective fire upon his part.

422. Against artillery in position the first object is to gain the ascendancy over it by inflicting as much damage as possible upon the personnel. Immediately effective fire is particularly demanded if the enemy can be attacked at a disadvantage, as, for example, while limbering or unlimbering. Obtaining a bracket as small as possible, searching the depth of the bracket, carefully observing the fire and securing as promptly as possible an accurate adjustment, are the means to be ordinarily employed in attacking the personnel.

Due to the difficulty, however, of reaching effectively the personnel of batteries provided with shields and posted in masked or semimasked positions, the struggle between evenly matched artilleries will often be long drawn out. If the enemy's artillery is temporarily overmatched, it may suspend its fire and shelter its personnel; but it must be expected to renew the struggle as soon as the pressure upon it is relieved. The aim must be to gain the superiority of fire by suitable concentrations of effort on the part of our own artillery; the opportunity may then be gained to destroy the enemy's material by well adjusted shell fire.

423. A slowly moving target such as infantry, or mounted troops impeded in their march, may be quickly bracketed by salvos and then attacked by searching fire.

Infantry in march formation may be thus attacked, but immediate deployment on their part is to be anticipated, and the officer conducting the fire should be prepared to reach them, probably behind cover, with a well distributed fire.

Infantry moving to attack in deployed lines or in line of small columns may be met by volleys successively reduced in range as the infantry approaches. If their formation is in line of small columns, the fire should be distributed so that a piece or platoon may bear upon each of the small columns.

At close ranges infantry will probably endeavor to advance by successive rushes from cover to cover. Such rushes may be met by volleys previously prepared for upon selected positions, evidently in the immediate path of the enemy. If the positions, occupied by important bodies of the enemy during the intervals of advance are well defined, accurately adjusted fire may be brought to bear upon such positions, and the ground between successive positions may be covered by searching fire when important movements of the enemy from one position to another are attempted.

424. In the case of a rapidly moving target, if the target is moving at right angles or obliquely to the line of fire, it is ordinarily best to adjust the fire upon some position in the path of the target and ahead of its movement and open with volleys or with zone fire as it approaches the position selected. If the target is moving parallel to the line of fire, or nearly so, the target may be bracketed and volley fire opened at that limit of the bracket toward which the target is moving, or at a lesser or greater range, the object being to bring fire to bear upon a point in advance of the movement of the target and to continue the fire until the target has passed through it. A target having been once brought under effective fire, its subsequent movements may be followed by volleys varying in range and direction, according to the rate and direction of march of the target.

425. The application of the methods of fire is further illustrated by the examples given below. In these examples the following nomenclature is employed:

Continuous fire	C. F.
Volley fire	V. F.
Zone fire	Z. F.
Deflection	D.
Deflection difference	DD.
Angle of site	AS.
Corrector	C.
Range	R.
Burst: A	Air.
G	Graze.

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Method of fire.	D.	DD.	AS.	C.	R.	Sense.	Burst.		Remarks.
							A.	G.	
By battery	3340	−5	285	25	4150	+	2	2	B. C.: "Subtract 15."
V. F. 4	([a])			27	4150				

[a] D = 3325; DD = − 5.

Movement of infantry to the front ceases. B. C. decides to search the road to the left rear. He shifts the sheaf to the left by 10 mils after each volley. He notes that the mean height of burst of the first volley was somewhat too low.

Method of fire.	D.	DD.	AS.	C.	R.	Sense.	Burst.		Remarks.
							A.	G.	
V. F. 3	([a])			29	4200				B. C.: "Add 10."
	([b])				4300				B. C.: "Add 10."
	([c])				4400				

[a] D = 3325; DD = −5.
[b] D = 3335; DD = −5.
[c] D = 3345; DD = −5.

Infantry disappears from view.

EXAMPLE III.

Situation: Battery in position sees hostile battery unlimbering in rear of crest. Heads of horses and of mounted men visible.

Range previously measured to a tree on the crest, 2500 yards.

Execution: Adjustment on crest.

Method of fire.	D.	C.	R.	Sense.	Burst.		Remarks.
					A.	G.	
By battery (from the left).[a]	6395	25	2500	−	2	2	Points of impact plainly seen on forward slope near crest.
	6390	27	2700	+	3	(?)	Balls of smoke from bursts in air cut in two by crest.
Z. F.			2500				

[a] A strong wind is blowing across the range from the right. The salvo is fired from left to right, so that smoke from the first shots will not interfere with observation of the last shots of the salvo.

Enemy disappears. B. C. decides to search the ground in rear of crest with salvos, with a view to securing a closer adjustment.

Method of fire.	D.	C.	R.	Sense.	Burst.		Remarks.
					A.	G.	
By battery	------	27	2600	+	3	1	Column of smoke and dirt thrown up by burst on graze is seen just in rear of crest.
		25	2700	+	1	2	The tops of the columns of smoke and dirt from two bursts on graze are seen. The fourth shot is lost.
			2800	+	----	----	Smoke seen rising behind crest a few moments after salvo is fired.

B. C. considers that if the hostile guns have remained in position ranges 2600, 2650, and 2700 are the most suitable for attacking them. He decides to employ these ranges to search the slope if the enemy's continued presence in rear of the crest is revealed by his opening fire or by other means.

EXAMPLE IV.

Situation: Hostile battery suddenly reveals its presence behind bushes bordering a road by opening very effectively upon our infantry. Top of their carriages visible from our guns, which are posted in observation.

Execution: Battery commander has formed the sheaf (par. 461) and directed it upon a selected registration mark.[a] By means of the B. C. ruler he finds the right of the target to be 130 mils to the left of the registration mark. He commands "Add 130" and announces the corrector and range.

Method of fire.	D.	DD.	AS.	C.	R.	Sense.	Burst.		Remarks.
							A.	G.	
By battery	(b)	------	------	27	3000	+	1	3	B.C.: "Subtract 10."
	(c)	------	------	----	2800	—	2	2	B.C.: "Add 5."
	(d)	------	------	----	2900	+	3	1	
V. F. 2	------	------	------	29	2800	--------	----	----	
V. F. 2	------	------	------	----	2850	--------	----	----	
V. F. 2	------	------	------	----	2900	--------	----	----	

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[a] The preliminary data announced for this purpose are: D = 2340; DD = —5; AS = 290; C = 27; R = 3000.

[b] D = 2470; DD = —5.

[c] D = 2460; DD = —5.

[d] D = 2465; DD = —5.

Enemy ceases firing. B. C. seeks closer adjustment of the range; he has noted that fire at the 2800-yard range was evidently ineffective. The platoon commanders obtain an accurate adjustment of the direction, observing the fire from the top of their caissons.

Method of fire.	D.	DD.	AS.	C.	R.	Sense.	Burst.		Remarks.
							A.	G.	
By battery				24	2850	−	1	3	
					2900	+		4	
C. F.				29	2850				15 seconds interval.
					2900				
					2875				

After cessation of the preceding fire it is observed that the enemy is endeavoring to move his guns by hand to the left.

V.F. sweeping	2465	+5		29	2875				

EXAMPLE V.

Situation: The presence of a hostile battery behind a certain railroad embankment is revealed by the flashes of its guns.

Battalion commanedr directs one of his batteries to secure the adjustment.

Execution: Battery commander: "Right platoon the adjusting platoon."

Method of fire.	D.	DD.	AS.	C.	R.	Sense.	Burst.		Remarks.
							A.	G.	
Right platoon	6110	+5	280	P.S.	3600	−		2	
					4000	±		2	Impact on embankment.
					4400	+		2	
					4200	+		(?)	Smoke seen rising behind embankment. Points of impact not seen.

The ground hidden by the embankment is thus limited between 4000 and 4400. B. C. decides to adjust height of burst and distribution while still further searching this hidden area.

Method of fire.	D.	DD.	AS.	C.	R.	Sense.	Burst.		Remarks.
							A.	G.	
By battery	------	------	------	28	4000	±	----	4	Impacts on embankment.
	6115	+7	------	33	4100	+	----	(?)	Smoke rising behind embankment.
				38	4200	+	----	(?)	Smoke rising behind embankment.
				[a]43	4300	+	2	2	Impacts visible yond embankment.
					4300	+	1	3	

[a] There is evidently a large error in the angle of site.
Corrector 48 appears from the subsequent firing to give the proper mean height of burst. This indicates that the angle of site is *18* mils too small. An error of *18* mils in the angle of site corresponds to an error of about 400 yards in range. The discrepancy in range to embankment as determined by the range finder (3600 yards) and the gun (4000 yards) is thus explained.

Battery commander considers target bracketed between 4000 and 4300 yards, and decides to search this area by battery salvos until he can secure the data for a closer adjustment. Battalion commander sends an observer to the flank to endeavor to determine the relative position of the flashes of the hostile guns with respect to the embankment.

EXAMPLE VI.

Situation: Flashes of enemy's guns are seen over a crest.

The upper portions of a line of trees on the reverse slope beyond the crest are visible. The terrain is hilly and broken, and observation is difficult on account of haze.

Execution: Battery commander decides to adjust his fire with respect to the crest in front and the trees in rear.

Method of fire.	D.	DD.	AS.	C.	R.	Sense.	Burst.		Remarks.
							A.	G.	
Right platoon.	3750	−5	312	Shell.	2800	(?)	---	---	Lost.
					2400	—	---	2	
	3765	−5	------	---------	2600	—	---	2	
					3000	(?)	---	---	Lost.
					3200	(?)	---	---	Lost. Smoke rising, apparently in front of crest; depression in front of crest suspected.
				30	3200	(?)	2	---	5 mils high.
	3760	−5	------	26	3200	—	2	---	Crest line obscured by smoke; no fragmental hits seen on crest.
					3400	+	2	---	The smoke from the bursts plainly cut in two by crest line; crest is thus bracketed between 3200 and 3400.
By battery----	------	------	------	---------	3300	±	2	2	Bursts on graze on forward slope of crest; fragments from bursts in air are seen to strike the crest.
	3762	−5	------	---------	3700	(?)	---	---	Lost.
					3500	+	3	(?)	Smoke plainly obscures the trees in rear.
					3600	+	(?)	(?)	Smoke rising from among trees.

From his observation of the fire and from the circumstances of the case the battery commander considers the target located between 3300 and 3500. He decides to search the ground by continuous fire at ranges 3300, 3400, and 3500 and be guided by his further observations and by the actions of the enemy as to subsequent adjustment and his subsequent method of fire.

EXAMPLE VII.

Situation: A battery is ordered to keep down the fire of a line of infantry entrenched on a ridge.

Front assigned 120 mils.

Execution: Battery commander seeks accurate adjustment in range. He converges the fire upon a prominent part of the target until the range is approximately adjusted and then distributes it to cover the full front.

An isolated bush near the right of the enemy's line is taken as the aiming point and also as the object upon which to converge the fire at the outset.

Method of fire.	D.	DD.	AS.	C.	R.	Sense.	Burst.		Remarks.
							A.	G.	
Right platoon	o	([a])	295	P.S.	2500	−	----	2	Impacts are plainly seen on slope in front of trench.
	5	------	------	------	2700	+	----	2	
					2600	−	----	2	
By battery----	----	------	------	27	2600	−	3	1	
					2700	+	1	(?)	
					2650	±	2	2	
	5	+30	[b] 295	29	2650	±	4	----	
					2650	±	3	1	
C. F. 4 rounds, sweeping----	----	------	------	29	2650	--------	----	----	
					2675	--------	----	----	

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[a] See par. 274 footnote, and par. 432, Rule II (P−T=8−8=0).

[b] As the ground slopes upward to the left and there is a difference of 15 mils in the angles of site of the right and left portions of the target, the battery commander orders that the angles of site be varied by increments of 5 mils from right to left.

A machine gun opens upon our infantry from left of enemy's line. Left piece is directed upon it, the other pieces maintaining their fire.

Left piece. V. F. 5--------	105	------	------	------	2675	--------	----	----	

Our infantry makes an important forward movement.

"All the pieces." V. F. 4 rounds, sweeping----	5	+30	------	------	2675	--------	----	----	

EXAMPLE VIII.

Situation: Enemy's infantry is seen advancing in line of small columns.

Execution: Adjustment on the front line of the advancing troops, each gun directed upon one of the small columns.

Method of fire.	D.	C.	R.	Sense.	Burst.		Remarks.
					A.	G.	
By battery	5	28	3200	−	----	4	
		33	3600	(?)	----	----	Presumably lost in woods beyond.
			3400	+	1	3	
			[a]3100	−	2	2	
V. F. 5	----	----	3100	--------	----	----	

[a] B. C. decides to reestablish promptly the short limit of the bracket.

Infantry is seen to be advancing rapidly in scattered order to occupy cover to their front.

V. F. 5	----	----	2900	--------	----	----	

It is obvious that the infantry in large numbers has taken shelter behind a certain low ridge. B. C. ordered to adjust on the ridge and search beyond, opening the sheaf to cover about 70 mils. He indicates to his platoon commanders the limits in width to be covered.

By battery	----	33	2600	−	----	4	
			2800	+	1	3	
		35	2700	±	2	2	
V. F. sweeping	----	----	2700	--------	----	----	
V. F. sweeping	----	----	2800	--------	----	----	

EXAMPLE IX.

Situation: Our infantry moves forward to attack a village. The terrain is wooded and broken.

A battery is ordered to accompany the infantry, with a special view to driving the enemy from shelter, which can not be effectively reached by our more distantly posted artillery, and to assisting our infantry in the later phases of the attack.

Execution: Movement from cover to cover, by fractions, if necessary.

Action by battery, platoon, or piece to overcome special resistance at points not reached by the other supporting batteries. Husbanding of ammunition until the last moments of the assault.

Battery is ordered to drive defenders from a wall from which a most galling fire has been coming.

Method of fire.	D.	C.	R.	Sense.	Burst.		Remarks.
					A.	G.	
Left platoon	2	Shell.	1600	—	----	2	
			1800	+	----	2	
			1700	+	----	2	
By battery	----	--------	1600	—	----	4	
			1700	+	----	4	
C. F.	----	--------	1650	--------	----	----	"10 seconds' interval."
			[a] 1675	--------	----	----	
							Enemy's fire ceases.

[a] The details of the continuous fire are as follows:

1650 yards. Round:		*1675 yards.* Round:	
First	—	Ninth	+
Second	—	Tenth	Hit.
Third	Hit.	Eleventh	—
Fourth	+	Twelfth	—
Fifth	—	Thirteenth	Hit.
Sixth	+	Fourteenth	Hit.
Seventh	—	Fifteenth	+
Eighth	—	Sixteenth	Hit.

1675 is accepted as the range and the fire continued at this range until the necessary effect is produced.

One piece is ordered to move to a position at head of ravine and drive defenders from a house.

Fourth piece	0	Shell.	1500	+	----	----	
			1300	—	----	----	
			1400	—	----	----	
			1450	Hit.	----	----	
C. F.	----	--------	1450	--------	----	----	"15 seconds' interval."
			1475	--------	----	----	

Village taken. Battery gallops to position on flank and opens on retreating infantry.

Method of fire.	D.	C.	R.	Sense.	Burst.		Remarks.
					A.	G.	
V. F. 2		30	600				
V. F. 4			700				
Etc.							

EXAMPLE X.

Situation: Cavalry suddenly appears around spur of hill, about 1500 yards away, and advances rapidly toward battery over open ground.

Execution: Battery commander takes range which is surely short, and opens rapid fire, his object being to establish instantly a fire-swept zone through which the enemy must pass to reach the battery.

Method of fire.	D.	C.	R.	Sense.	Burst.		Remarks.
					A.	G.	
V. F. 10	0	[*]30	1000				

[*] That corrector is employed which previous experience with the fuses in use has shown to be most suitable.

A portion of the cavalry passes through the fire-swept zone and continues rapidly toward the guns.

Fire at will							

EXAMPLE XI.

Situation: Enemy's artillery behind a certain low crest is causing loss to our infantry. Commander of a battalion of artillery from an elevated position well to the front and flank of his battalion is able to see the flashes of the enemy's guns and to determine that the guns are close behind the covering crest.

Execution: Battalion commander conducts the fire of his battalion, which is in line with the guns at 20-yard interval throughout. He employs during the preliminary adjustment first the right platoon of the right battery and then the right battery, converging the fire upon the right section of the target. He secures the final adjustment by means of battalion salvos, distributed over the front to be covered. Adjustment on crest.

Method of fire.	D.	DD.	AS.	C.	R.	Sense.	Burst.		Remarks.
							A.	G.	
Right platoon	3450	−10	315	P.S.	4000	+	----	2	On hillside in rear.
	3470	−10	------	------	3600	−	----	2	
					3800	−	----	2	On slope in front of crest.
	3465	−10	------	------	3900	+	----	(?)	Smoke rising behind crest.
By battery	------	------	------	28	3850	(?)	4	----	Eight mils high.
				21	3850	±	1	3	The bursts on graze are on or near the crest.
					3950	+	2	(?)	
					4000	--------	1	2	Two of the bursts on graze are seen on the hillside in rear; the other is not seen.
By battalion	3465	[a]− 8	------	23	3850	--------	8	4	
				25	3900	--------	10	(?)	
					3950	--------	9	(?)	
V. F. 2	------	------	------	------	3900	--------	----	----	
V. F. 2	------	------	------	------	3950	--------	----	----	

[a] Battalion commander sees the flashes of six guns and finds the front occupied to be 25 mils. The distribution difference is $=\frac{25}{12}=2$. The convergence difference is= −10. Hence DD.= −8.

SECTION III.—*Dispositions and duties incidental to preparation and conduct of fire.*

1. *DETERMINATION OF THE DEFLECTION OF THE RIGHT PIECE AND THE DEFLECTION DIFFERENCE.*

Deflection Difference.

426. The principles involved in the determination of the deflection difference are best explained by assuming the target to be visible from the guns. Elementary instruction is best conducted, moreover, with the guns placed so that this will be the case, as a check may then be had on the computations made.

427. If the guns of a battery at normal or other equal intervals are, with zero deflection, laid accurately upon the same part of a target—for example, its right edge—and the lines of sight are then all directed upon a common aiming point, the deflection readings will be found to increase or decrease from right to left by a common difference. This common difference in deflection is termed the ***convergence difference.*** It is the deflection difference necessary to produce converging fire, being positive if the deflections increase from right to left, negative if they decrease.

428. The convergence difference may thus be measured directly if the guns are in position and the target can be seen through the sights. But the data should, in the general case, be obtained before the guns come up. Moreover, when indirect laying is to be employed the target is not usually visible from the guns. Direct measurement of the convergence difference is not then feasible in the usual case. By computation, however, its value may be quickly determined as follows:

(*a*) Determine the parallax[a] of the aiming point and the parallax of the target.

(*b*) The convergence difference is equal to the parallax of the aiming point diminished ***algebraically*** by the parallax of the target. It is additive if this algebraic difference is positive, subtractive if it is negative.

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[a] By the parallax of the target or aiming point is to be understood the angle subtended at the point in question by the width of a platoon front at the battery. Its value in mils is quickly calculated by dividing 20 (width of a platoon front) by the number of thousands of yards in distance from point to battery. Thus, if the distance to target is 2800 yards, its parallax is 7. Fractions are disregarded in making the calculation, the nearest whole number being taken.

If the aiming point is to the rear of the battery, its parallax is always negative.

If the line from the position of the guns to the point whose parallax is sought is considerably oblique to the normal to the battery front, then a correction for ***obliquity*** is applied to the parallax. The necessary correction may be obtained from the table on B. C. ruler. (See Handbook of 3" F. A. Material.) If the obliquity is less than 400 mils, no correction is necessary.

Refinements in the computation of parallax are uncalled for. With a little experience the values of the parallaxes of objects at the usual artillery distances are immediately appreciated; thus: 10 at 2000, 8 at 2500, 7 at 3000, 6 at 3500, 5 at 4000, 4 at 4500, and 4 at 5000 yards. The integral number which comes nearest to the true value of the parallax is taken, the choice as between a higher and lower number being decided immediately in favor of the lower number, if a little obliquity exists.

429. Assuming the guns to be still converged upon the right edge of the target, their fire may now be evenly distributed over the whole front of the target if we retain the same aiming point for all the pieces and the same deflection for the right piece, but increase the deflection of each of the other pieces by an amount necessary to cause its line of fire to be directed upon its appropriate part of the target. The common difference in deflection necessary to effect this distribution is termed the ***distribution difference.*** Its value is obtained by dividing the front of the target, expressed in mils, by the number of guns in the battery. It is always additive, provided the right gun is directed upon the right section[a] of the target, and the difference is applied in arithmetical progression to the deflection of the right piece, to determine the deflections of the other pieces in turn from right to left.

430. The algebraic sum of the convergence difference and the distribution difference is the ***deflection difference.*** If converging fire is to be used, the distribution difference is zero and the deflection difference hence is equal to the convergence difference.

431. The following nomenclature may be used to designate the terms referred to above:

DD	Deflection difference.
CD	Convergence difference.
F	Front of target in mils.
P	Parallax of aiming point.
T	Parallax of target.

432. Using this nomenclature, the relations brought out in the foregoing discussion may be expressed as follows:

Rule I: The convergence difference is equal to the parallax of the aiming point diminished algebraically by the parallax of the target; or, CD=P—T.

Rule II: For converging fire the deflection difference is equal to the convergence difference; or, DD=P—T.

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[a] In shrapnel fire the right piece is directed, not upon the right edge of the target, but upon a portion of the target about 10 yards within the right edge. Each gun is supposed to cover a section 20 yards wide, this being about the effective width of the shrapnel sheaf.

Rule III: For distributed fire the deflection difference is equal to the convergence difference increased algebraically by the distribution difference; or, $DD=P-T+\frac{1}{4}F$.

A special case of distributed fire is ***parallel fire.*** If the lines of fire are parallel they are directed upon points just a platoon front apart. Therefore, in Rule III, $T=\frac{1}{4}F$, and $DD=P$. Hence we have

Rule IV: For parallel fire the deflection difference is equal to the parallax of the aiming point; or, $DD=P$.

433. The foregoing rules afford a method of determining the ***deflection difference*** necessary to produce either converging or distributed fire. If the pieces have a common aiming point and the right piece is given a deflection which will cause its line of fire to be directed upon the right section of the target, the desired convergence or distribution may be secured by giving the other pieces the deflection of the right piece increased (or diminished) by as many times the deflection difference as there are platoon fronts between the right piece and the piece considered.

Rule IV affords the quickest and readiest means of distributing the fire, since, to determine the deflection difference, we have only to estimate the distance to aiming point and compute the corresponding parallax. For the attack of targets having about the same front as the battery, the approximate amount of distribution is thus promptly obtained. If, after opening fire, the distribution appears too great or too small, then it may be promptly adjusted by modifying the deflection difference.

Deflection of the Right Piece.

434. If possible, the angle (A) from aiming point to target is measured at or near the position of the right piece by using the sights or any convenient means of reading horizontal angles (par. 452).

If, however, the target can not be seen from the vicinity of the guns, then the observer posts himself where he can see the target, measures the angle, and transforms it for use at the guns.

435. This transformation may be effected (*a*) by the ***parallax method,*** (*b*) by the use of a mechanical device termed ***The Plotter.***

The parallax method is used to the best advantage when the observing station is in prolongation of the line of guns and not more than 400 or 500 yards away. It is an extremely quick method, the necessary computations being readily made mentally after facility has been gained.

The Plotter solves the problem in the general case, being independent, within the limits of its scales, of distance or direction. Its special purpose is to make the necessary transformations both of range and of direction when considerable distances separate the observing station and guns.

436. (*a*) ***The Parallax Method:*** To illustrate this method, let us assume that the observing station is on the right flank of the guns, in prolongation of their front, and at a distance of *n* platoon fronts from the right piece.

At the observing station the angle A, from aiming point to right section of the target, is read by means of the B. C. telescope or ruler. This angle may be considered as the deflection necessary to cause an imaginary piece at the observing station to be directed upon the right section of the target; the actual right piece, *n* platoon fronts away, may be converged upon the same part of the target by increasing (or diminishing) the deflection of the imaginary piece by *n* times the convergence difference. The process is then altogether similar to that before explained for causing convergence in an established line of guns. We have then

Rule V: The deflection of the right piece is equal to the angle from aiming point to target, as measured at the observing station, increased algebraically by as many times the convergence difference as there are platoon fronts in the interval between observing station and right piece; or, $D = A + n\ (P-T)$.

If the observing station is on the right flank, *n* is positive in the foregoing formula, negative if it is on the left flank.

437. If the observing station is not on the prolongation of the line of guns, but is in advance or rear of that line, the interval between observing station and right piece must be measured perpendicular to the line joining the right piece and the target.

In the latter case the data secured will probably be only approximately correct; but the error in direction should not be great, and errors both in direction and distribution should be readily corrected at the second salvo.

438. The parallax method thus outlined gives great facility in transforming the deflection, not only from an observing station to a battery, but from battery to battery along a line of guns having a common aiming point. A great variety of special cases will be met in practice, but if the possibilities of the method are fully grasped some adaptation will usually afford a solution. By constant practice in the solution of all sorts of cases readiness in the use of the method is to be obtained. The great advantage of the method is that it permits a rough approximation of the direction from gun to target to be quickly furnished. The approximation should be close enough to permit the first salvo to be observed; errors in the adjustment may then be quickly recognized and corrected.

439. (*b*) ***Use of the Plotter:*** The Plotter is a mechinical device which permits us to transform the range and direction of the target as obtained at the observing station so as to make the data available for use at the guns.

At the observing station the distances to target, aiming point, and right piece are measured by the range finder; the angles from aiming point to target and to right piece are measured by the B. C. telescope. The data as found at the observing station are then set off on the instrument, the protractor is moved along its slide a distance corresponding to the distance between observing station and right piece, and the range and direction of the target from the right piece are read off.

The ***deflection of the right piece*** is thus determined. Knowing the distances from right piece to target and aiming point, the ***deflection difference*** is readily found by Rule II, III, or IV.

440. In determining the data for indirect laying, the following is a summary of the operations usually necessary when an observing station on the flank of the guns must be taken and a suitable one can be found within 400 or 500 yards of the guns:

1. Select an observing station from which a good view of the target and its surroundings may be obtained, which is as close to the guns as the conditions permit and which is as nearly as possible on the prolongation of their front.

2. Select an aiming point which is surely visible to all the guns, whose direction is as nearly normal to the front of the battery as possible, and whose distance from the battery is preferably between 2000 and 6000 yards.

3. Set up the B. C. telescope[a] at the observing station, measure the angle from aiming point to target, and while the tele-

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[a] If time does not admit of the setting up of the B. C. telescope, an aiming point should be chosen near the normal to the battery front and the B. C. ruler used for the necessary measurements.

scope is on the target measure the angle of site and the front of the target in mils.

4. Measure or estimate the distance to aiming point and target and compute the parallaxes of each. Correct a parallax for obliquity if the line from gun to corresponding point makes an angle greater than 400 mils with the normal to the front of the battery.[a]

5. Determine the convergence difference by Rule I, estimate or measure the distance to right piece, and apply Rule V for the determination of the deflection of the right piece.

6. Determine the deflection difference by Rule II, III, or IV.

7. Correct the angle of site, if necessary, for difference of level between observing station and guns, adopt the corrector which previous fire has shown to be the most suitable, and take the range as measured or estimated.

EXAMPLES.

Example 1: A battery is ordered to take a masked position and be ready to fire upon an indicated hostile battery whose range is known to be 2100 yards. The battery commander finds an observing station 200 yards[b] to the ***left*** flank and on the prolongation of the battery front. He selects an aiming point in rear, 5000 yards away.

At the observing station he finds: A=2600 mils; F=30; A. S. (angle of site) =293. He notes that the observing station and guns are practically at the same level.

He computes:

$P=-20/5=-4$, or, $=-3$ when corrected for obliquity ($A=2600$).

$T=20/2=10$.

$P-T=-3-10=-13$.

$1/4F=7$.

$DD=-13+7=-6$.

$n=-10$.

$D=2600-10\ (-13)=2600+130=2730$.

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[a] As a rule it is not necessary to correct the parallax of the target for obliquity. In correcting the parallax of the aiming point for obliquity it is usually sufficiently accurate to consider the deflection of the right piece as indicating the degree of obliquity of the aiming point.

[b] The distance is always measured from the *right* or directing piece.

The battery commander commands:

1. *Aiming point, that chimney.*
2. *By battery from the right.*
3. *Deflection, 2730.*
4. *Diminish by 5.*[a]
5. *Angle of site, 293.*
6. *Corrector, 28.*
7. *RANGE, 2100.*

Example 2: A battery which has just taken an unmasked position and is firing upon a disorganized enemy is directed to turn its fire upon a large body of retiring infantry. From the position of the guns the target can not be seen.

The battery commander finds a place 150 yards to the right flank and slightly in front, from which he can see the target. Using the B. C. ruler, he measures the angle from a prominent tree to the column as 350 mils; he estimates distance to target as 2500 yards, to aiming point 4000 yards, to right piece 150 yards.

He computes:

$P=5.$
$T=8.$
$P-T=-3.$
$n=7.$
$D=350+7(-3)=329.$

He estimates the target to be on the level with his guns, decides to use parallel fire, and commands:

1. *Aiming point, that lone pine tree.*
2. *By battery from the right.*
3. *Deflection, 330.*
4. *Increase by 5.*
5. *Angle of site, 300.*
6. *Corrector, 28.*
7. *RANGE, 2500.*

The captain estimates the *direction* of the first salvo as 10 mils too far to the right, the *distribution* as somewhat too small, the *height of burst* as high (all four burst in air, mean height 9 mils), and the *range* as indeterminate (on account of the high bursts).

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[a] See par. 392.

He commands:

Deflection, 340.
Increase by 7.
Corrector, 20.[a]
RANGE, 2500.

and fires such other salvos as may be necessary to effect the adjustment.

Example 3: Having fired upon the target of previous example until it disappears, the battery commander sees another body of troops whose range he estimates as 3000 yards. Using the B. C. ruler he finds that this target is 200 mils to the right of the last target and that its angle of site is 295.

He commands: "Subtract 200," and then:

1. ***By battery from the right.***
2. *Angle of site, 295*
3. *Corrector, 20.*
4. ***RANGE, 3000.***

The last example is not an example of transformation of angles by the parallax method, but is introduced to show how readily the fire may be shifted from point to point.

Example 4: A battery is ordered to take a masked position in observation and be ready to assist in the attack of an entrenched infantry position. Front assigned=85 mils; measured range=2500 yards.

By taking post on an observing tower about 50 yards in rear of the right piece, the battery commander is enabled to see the target. He designates an aiming point in rear, distance 5000 yards, and finds angle from aiming point to target to be 3450. He decides to take this angle as the deflection of the right piece without change.

He computes:

$P = -4.$
$T = 8.$
$P - T = -12.$
$\frac{1}{4}F = 21.$
$DD = 9.$

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[a] See par. 396.

He decides to use the right piece to secure the rough adjustment in range, and cautions: ***"Right piece the adjusting piece."***

1. ***Aiming point, as indicated.***
2. ***Deflection, 3450.***
3. ***Increase by 10.***
4. ***Angle of site, 291.***
5. ***Percussion shrapnel.***
6. ***RANGE, 2500.***

After securing the adjustment of the right piece in direction and a rough adjustment in range, salvos are fired for the exact adjustment of the range, height of burst, and distribution, and then volleys sweeping or continuous fire sweeping are used, according to the degree of activity shown by the hostile infantry and the character of the assistance required by our own infantry.

For continuous fire the captain would command, for example:

1. ***Continue the fire.***
2. ***Sweeping.***
3. ***15 seconds interval.***
4. ***RANGE, 2625.***

For volleys:

1. ***Volley fire.***
2. ***Sweeping.***
3. ***RANGE, 2625.***

Example 5: If the front assigned the battery is 125 mils, for example, instead of 85 mils as in the preceding example, then it will be necessary to fire more than three rounds in the sweep. The battery commander finds that the front ***in yards*** is $125 \times 2.5 = 312$ yards, and that each gun must hence cover about 80 yards. As each round covers 20 yards, it will be necessary to fire four rounds sweeping to cover the entire front.

He computes:

$P = -4.$

$T = 8.$

$P - T = -12.$

$\frac{1}{4}F = 31.$

$DD = 19.$

The adjustment may be procured as before, the deflection difference used during the verifying salvos being *20.*

For continuous fire the captain commands, for example:

1. ***Continue the fire.***
2. ***4 rounds, sweeping.***
3. ***10 seconds interval.***
4. ***RANGE, 2625.***

For volleys:

1. ***Volley fire.***
2. ***4 rounds, sweeping.***
3. ***RANGE, 2625.***

2. OBSERVING STATIONS.

441. The officer conducting the fire must be posted so that he can see all the territory assigned to him to cover, properly observe the fire of his guns, and promptly communicate with them.

To facilitate the quick transmission of orders and the proper exercise of command, the station should be as near the guns as the conditions permit.

Removal from the neighborhood of the guns may often be avoided by using elevated observing stations such as trees, buildings, etc., or a specially prepared ladder or tower.

When the observer is in immediate proximity to the guns, it is usually necessary for him to take post on their windward flank.

442. When masked fire is to be employed, the posting of the batteries is often greatly affected by the matter of securing good observing stations. The commander of an isolated battery may have a wide latitude in the selection of his observing station. But when the guns of a battalion or regiment must be posted in the same general locality, observing stations on the flanks of interior batteries and at considerable distance therefrom are generally impracticable; for, even if the entire available front is not needed for the guns, observing stations on the flanks of interior batteries may unduly restrict the field of fire of adjoining batteries.

The batteries must hence be posted so as to take the best advantage of natural observing stations, and artificial stations must be erected where natural ones are lacking.

443. If the station is in immediate proximity to the guns or is apt to be subjected to the enemy's searching fire, suitable protection from hostile fire should, whenever possible, be provided for the observing officer.

3. AIMING POINTS.

444. When indirect laying is to be employed, the selection of a suitable aiming point calls for special attention. The aiming point should be:

1. Surely visible from the emplacement of each gun;
2. Distinctive and easily picked out;
3. At a considerable distance from the guns; and
4. Preferably near the normal to the line of guns.

If any doubt whatever exists as to the visibility of the aiming point, it is always best, before the guns come up, to go to the point where each gun is to be placed and make sure that the aiming point will be visible through the sights from that point.

Some object which quickly attracts the eye should be selected; and, if possible, it should be the only object of its kind in the vicinity, so that doubt, hesitation, and mistakes may not arise, either in the designation of the aiming point or in finding it quickly after looking away.

A distant aiming point is preferable, for the more the aiming point is removed from the guns the more are errors in calculation of parallax minimized. But it is not desirable to take inconspicuous aiming points or those at distances so great as not to be readily determinable. Usually points not less than 2000 and not more than 6000 yards distant will be found most suitable.

A point in rear or in front of the guns and near the normal to their front is always to be preferred, provided it is at least 1000 yards distant. If the aiming point must be closer than 1000 yards, then it is best to have it on the flank.

445. If the distant aiming point is apt to be obscured by mist or smoke, then a secondary aiming point should be provided for. A stake may be put up for the purpose. The guns having been oriented on the target by means of the distant aiming point, the sights may, when necessary, be turned upon the new aiming point (as in par. 154) and the latter used in subsequent fire.

446. If an aiming point visible from all the guns and from the observing station can not be found, then some expedient must be devised for directing the guns upon their targets. The following are given as examples of such expedients:

Example 1: The guns are in a depression and all view of the surrounding country is cut off. No natural aiming points are available. The battery commander, mounted on an observing tower, can see the target provided his tower is placed in rear of the third piece.

Solution.—The battery commander places his tower in rear of third piece and, looking over the line of metal, directs the gun upon its appropriate part of the target.

He causes the gunner of the third piece to turn his panorama sight upon the sights of each of the other pieces in turn and to read off the corresponding deflections. For pieces to the right of the third piece, this deflection is increased by 3200; for pieces to the left it is diminished by 3200. The resulting deflections are in each case set off on the sights of the respective pieces and they are then laid, using the sight of the third piece as an aiming point. ***Parallelism*** of the lines of fire is thus secured.

The direction of each piece may then (par. 154) be rferred to an individual aiming point consisting of a stake driven in front or rear of the piece, or preferably to a common aiming point consisting of a stake or pole erected to the right rear of the pieces.

Example 2: Suitable aiming points can be seen from the guns, but none of them are visible from the observing station, which, on account of the lay of the ground, must be placed about 400 yards to the flank of the guns.

Solution.—The battery commander decides to designate his B. C. telescope as a temporary aiming point. He determines the deflection of the directing piece as follows:

(*a*) Sets the telescope at 3200, directs it upon the sight of the directing piece and clamps the lower limb; unclamps the upper limb, directs the telescope on the target, and reads the angle.

(*b*) Measures or estimates the interval in yards between telescope and gun, divides this amount by the number of thousands of yards in range to target, and thus procures the parallax of the target for the interval between telescope and gun.

(*c*) Adds this parallax to the angle measured by the telescope if the telescope is on the left of the guns, subtracts it if the telescope is on the right.

The result is the deflection to be used by the directing piece, the telescope being the aiming point.

Setting off this angle on the sight of the directing piece and using the B. C. telescope as an aiming point, the piece is laid on the target. The direction of this piece may then be referred to any suitable aiming point in front or rear of the guns (par. 154). By computing the deflection difference in the usual way, the deflection to be given the other pieces may then be determined.

4. *FIRING OVER A MASK.*

447. When a position for masked fire is to be occupied, it is necessary to make sure that the projectiles from each gun will clear the mask and reach ground which is occupied or is expected to be occupied by the enemy.

If the guns are already in position and the mask is not more than 200 or 300 yards in front, then the guns may be given the elevation and angle of site corresponding to the nearest expected position of the enemy, and a glance through the bores will tell whether the projectiles will clear the mask.

In the general case, however, this information should be obtained before the guns arrive, so as to preclude indecision and delay in posting them. It is necessary first to decide what is the nearest position beyond the mask in which we must be prepared to strike the enemy and what is the minimum angle of site to be used. We can then decide whether from the contemplated position of the guns the projectiles will clear the mask and reach the desired territory. If they will not, then we must quickly find the place from which they will.

To solve the problem, we determine the height of trajectory in mils at the mask and then compare this with the height of the mask in mils.

448. The sliding scale on B. C. ruler may be used to determine the height of trajectory at the mask as follows:

1. Determine (*a*) the distance from guns to mask, (*b*) the difference of level in mils between guns and target, (*c*) the range to target.

2. Move the sliding scale on ruler until graduation indicating difference of level between guns and target is opposite that indicating distance to mask; then opposite graduation indicating range to target we will find ***height of trajectory*** (*h*) in mils at the mask.

3. Determine the height of the mask in mils. If it is less than *h*, the projectile will clear the mask; if not, move backward or forward until a point is reached where it is less.

449. Differences of level in mils may be determined by means of the B. C. telescope, by subtracting 300 from the angle of site and preserving the proper algebraic sign. But if time presses or the telescope is not available, then fair results may be obtained with the B. C. ruler. Thus: Select by eye an object at the same level as the observer for a datum point; then, holding the ruler vertically, use the deflection scale as in measuring horizontal angles.

450. The use of the sliding scale on the ruler may be exemplified as follows:

Example: A position about 200 yards in rear of a crest is contemplated, which will be masked from the opposing artillery and will permit fire on an advanced infantry position which is about 2000 yards from the guns and has an angle of site of 315.

We have:

$R = 2000$ yards.
$d = 200$ yards.
$s = 15$ mils.

Placing $+15$ of the sliding scale opposite range 200 on the ruler, we find opposite range 2000 the value 63 for h.

The angle of site of the crest is found by the B. C. telescope to be 340; that is, the crest is 40 mils above the position contemplated for the guns. The projectiles will clear the crest by 23 mils.

451. The sliding scale on the ruler also permits us to tell at once the minimum range at which we can fire and still clear the mask. Thus, taking the data of the preceding example, it is quickly determined that the minimum range at which we can fire is 1300 yards.

5. MEASUREMENT OF ANGLES.

452. Angles may be measured in mils by means of the B. C. telescope, the B. C. ruler, or by handbreadths.

The B. C. telescope affords a means of obtaining an accurate measurement of angles. When the telescope is not available, or when time does not admit of its being set up, use may be made of the B. C. ruler or of handbreadths. With practice, measurements sufficiently accurate in the ordinary case may be obtained by either method.

453. In preliminary practice with the ruler or handbreadths the operator should check his results by means of the B. C. telescope, so that he may acquire the habit of holding the ruler or hand at the proper distance from the eye, and, in the case of measurements by hand, of using the proper portions of the hand or fingers. For this purpose a scale of mils may be laid out on any convenient vertical surface by means of the B. C. telescope; the operator then stands at the telescope and holds the ruler or hand so that the graduations of the ruler or the different portions of the hand will just cover the corresponding units of this scale.

454. For measuring by handbreaths each individual will obtain the best results by predetermining, according to the methods just described, the value in mils of certain parts of his hand.

Average values are given below, it being presumed that the hand is held vertically, palm outward, arm fully extended to the front:

	Mils.
Width of first finger at second joint	40
Width of second finger at second joint	40
Width of third finger at second joint	35
Width of little finger at second joint	30
Width of first, second, and third fingers at second joint	115
Width of first, second, third, and little fingers at second joint	150
Width of thumb	40

6. DESIGNATION OF OBJECTIVES.

455. Targets and aiming points must be designated in a concise and unmistakable manner. Officers must exercise themselves in describing objectives of all kinds, in all available forms of terrain, and must accustom those under them to the terms and methods employed in the description. Practice of this character should habitually form a part of firing instruction, and should also be included in the instruction of scouts, agents, and range finders.

If the targets are distinct and clearly defined, they may be designated by name, as, for example, "The battery on hill 1240," "Cavalry to the right front," etc. But if the target is indistinct and poorly defined, or if it is masked, then each unit may be assigned so many mils of a given front to attack.

456. In designating objectives of any kind (targets, aiming points, registration marks, etc.) the following procedure is appropriate, especially when the objective is not conspicuous nor readily recognized:

Define the ***relative position*** of the objective and its ***characteristics.*** The ***relative position*** is fixed by giving the approximate direction and distance of the objective and its situation with respect to prominent features of the landscape. The ***characteristics*** usually important are the nature of the object, its shape, and color.

If the objective is in itself inconspicuous, then it is usually best to first designate the most prominent object in its general direction, give the angular distance between this auxiliary objective and the real objective, and then describe the latter as before.

The usual method of procedure is as follows:

1. Indicate the general direction of the objective.
2. Designate the most prominent object in the zone indicated.
3. State the angular distance from this auxiliary object to the objective.
4. Designate the objective.

Thus:

1. To our right front.
2. At 3000 yards a large stone house, square, two-storied, with a cupola on top.
3. 500 mils to the right of the cupola.
4. At 2500 yards a battery of artillery in position in rear of the large orchard.

Or:

1. To the left rear.
2. At 4000 yards a line of hills with three plainly marked and well-wooded valleys.
3. 350 mils to the left of the left valley.
4. On the sky line of the hills a lone tree, low and bushy.

Or:

1. Straight to the front.
2. At 3500 yards a farmhouse in a grove of trees on a ridge.
3. Commencing at 500 mils from the left-hand tree of the grove.
4. Cover 100 mils of the crest line.

457. Targets and aiming points are preferably designated by word of mouth and to a person standing nearby. On the occupation of a position the aiming point and the expected targets should, as far as practicable, be thus pointed out to the officer commanding the guns.

458. If it is necessary to send this information to a person at a distance, it is important to remember that objects often present very different appearances if viewed from widely separated positions. For this reason it is desirable to select as aiming points objects having a uniform outline, and hence presenting the same appearance from whatever angle they are viewed. The information is transmitted by couriers or telephone. If a courier is used, he is required to keep the objective in view as much as possible while passing from one station to the other.

459. The designation of objectives may be greatly facilitated by causing a panorama sketch of the terrain to be prepared and copies to be furnished the different subordinate commanders concerned. On such a sketch important landmarks and military objectives should be named or numbered, so that they may be readily referred to.

7. OBSERVING THE TERRAIN; SECTORS OF OBSERVATION; FORMING THE SHEAF; PREPARATIONS FOR FIRING.

460. In preparation for definite and imminent phases of an action, certain bodies of artillery may be ordered to ***observe*** the enemy in designated portions of the terrain and be ready to bring him under immediately effective fire.

If possible, the position of the enemy is clearly pointed out; but if his exact position within a certain area has not been determined the area may be divided up into sectors and a sector assigned to each important group of artillery. In the former case the firing data are determined for the known position of the enemy; in the latter case, for prominent features of the terrain within the sector assigned.

With a view to gaining readiness for instant action, the guns may be laid upon the target or upon some selected feature of the terrain and the ***sheaf*** formed so as to provide for the desired distribution.

461. To ***form the sheaf,*** an aiming point is selected, a deflection is given the right piece which will cause it to be directed upon the right section of the target, or upon the registration mark, and a deflection difference is employed which will suffice to distribute the fire over the known or expected front.

If the position of the enemy is known and all necessary data have been obtained, the pieces may be at once loaded.

If the exact position in which the enemy will appear is not known, then on his appearance the necessary corrections in range and direction must be quickly estimated (or measured) and set off. The correction in range is obtained by estimating the target's distance from the selected registration marks; the correction in deflection by measuring, by means of handbreadths or the B. C. ruler, the angle from the registration mark to the section of the target which is to be attacked by the directing piece. The circumstances of the case must decide whether the pieces are loaded before the target appears.

462. Trenches should be dug for the trails wide enough to permit them to be shifted through the probable arc of fire.

The safe arc of fire may be taken as 45° on either side of the normal to the battery front, the presumption being that the guns are well aligned. In all cases, however, it is the duty of chiefs of platoon and section to see that their pieces are not fired when pointed at a dangerous angle with respect to other pieces.

463. At a mean range (about 3000 yards) a battery may be expected to cover effectively a front of about 30 mils if parallel fire is used, and a front of about 70 mils if the normal sweep (three rounds) is used. For a parallel fire the deflection difference is always equal to the parallax of the aiming point ($\pm P$); for the normal sweep a tentative deflection difference equal to $P+10$ may be taken for targets at mean ranges.[a]

464. The initial opening of the sheaf depends upon the nature of the expected target and the circumstances of the action. Thus if the enemy's artillery is the expected target a parallel formation of the sheaf may be preferable, while if lines of infantry are to be attacked a more open formation may be appropriate.

If, in order to assist our own infantry, the artillery is called upon to repress the activity of a long line of hostile infantry in position, each battery may be required to act over a wide front. Good judgment and great versatility in the employment of fire are called for under such circumstances, in order that the desired results may be obtained without undue expenditure of ammunition in the earlier phases of the attack. Means may be employed to keep the entire hostile line under the menace of fire, single guns being freely used to repress special activity of the enemy in the sections assigned to such guns.

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[a] The parallax of such targets may be taken as 7 without great error. We have, then, the convergence difference$=P-7$, the distribution difference$=70/4=17$, and the deflection difference$=P-T+1/4\ F=P-7+17=P+10$.

9. REGISTRATION OF FIRE.

465. Artillery already in position may take advantage of lulls in the progress of an action to register its fire upon positions in which an enemy is known to be or in which he is expected to appear. The nature and circumstances of the action determine the relative importance, on the one hand, of securing this information, and, on the other, of keeping concealed the position of our own artillery.

466. The purposes of fire for registration are:

(*a*) To determine the firing data for reaching certain prominent features of the terrain, such as crests, edges of forests, villages or cultivated fields, houses, etc.

(*b*) To discover by actual fire the accidents of the ground which might conceal an enemy or hide the points of burst of our projectiles.

(*c*) To thus gain the ability to open immediately effective fire upon a target appearing at or near these prominent features of the terrain.

467. Registration of fire is especially appropriate for artillery to which definite sectors of observation have been assigned, as the necessary firing data may thus be most readily obtained.

If the position of the enemy within the sector is definitely known—as, for example, that he is behind a certain crest or in the edge of a certain piece of woods—the fire is directed upon some prominent landmark at or near the enemy's position as a registration mark, and the data thus secured in advance for opening prompt and effective fire.

If, however, the enemy's position within the sector has not been located, the artillery commander proceeds in a systematic way to secure the data which will enable him to reach promptly and effectively any part of the sector. He studies the terrain, decides upon the limits in width and depth of the area to be registered, notes the specially prominent features of the terrain within these limits, and by actual firing directed upon these natural features secures the data which will enable him to reach promptly any target appearing in their vicinity.

PART IV.

MOUNTED INSTRUCTION.

CHAPTER I.—THE SOLDIER MOUNTED.

(See ***SCHOOL OF THE SOLDIER MOUNTED,*** pages 112 to 166, Drill Regulations for Light Artillery, 1896.)

CHAPTER II.—THE GUN SQUAD MOUNTED.

(See ***HORSE ARTILLERY,*** pages 167 to 182, Drill Regulations for Light Artillery, 1896.)

CHAPTER III.—THE DRIVER.

SECTION I.—*Object and sequence of the instruction.*

468. The object of this instruction is the detailed training of the individual drivers:

First. In harnessing and unharnessing, and in fitting and properly cleaning and caring for harness.

Second. In managing and maneuvering a single pair, and in the proper care of draft horses.

Third. In managing and maneuvering the different pairs of a team hitched.

Quiet, well-trained horses will be used in the instruction of recruits.

469. In order to vary the mounted instruction of recruits, their training as drivers may advantageously be begun as soon as they have had elementary instruction in the duties of the soldier mounted. The two kinds of instruction are then continued concurrently.

SECTION II.—*General provisions.*

470. ***Guides:*** When two or more pairs, teams, or carriages march in line, the instructor, as soon as the march in line is begun, designates the element on one flank or the other as the guide of the movement, thus: ***Guide right*** (***left***). The other elements align themselves on the guide thus indicated and maintain their intervals from that flank.

If marching in column of pairs, teams, or carriages, or if marching obliquely, the leading element is without indication the guide of the movement.

The guide of a team or carriage is its lead driver. The guide of a section in section column is the guide of its leading carriage; in double section, the guide of its left carriage.

The guide is responsible that the direction and rate of march are properly maintained.

471. ***Intervals and distances:*** The interval between pairs in line is two yards; between teams, team length (nine yards); between hitched carriages, carriage length (seventeen yards).

The distance between pairs in column is one yard; between teams or carriages, two yards.

472. ***Rests:*** The rests are executed and the attention resumed according to the principles prescribed in The Soldier Mounted; the drivers, when dismounted, remain on the left, close to their pairs, so as to keep them in place.

After exercise, the drivers, when dismounted, should raise the collars from the shoulders and adjust the harness if necessary.

473. ***To stand to horse:*** The driver takes the position with respect to the near horse, prescribed for the soldier mounted, and holds in his right hand the reins of the near horse and the coupling rein.

During detailed instruction the drivers stand to horse (or heel), after completing each detail of the instruction.

SECTION III.—*The individual driver.*

474. Each driver is assigned two horses, which are called a ***pair;*** the horse on the left side is called the ***near horse;*** the other, the ***off horse.*** The driver rides the near horse.

In this instruction not more than three drivers are ordinarily assigned to a single instructor.

Disposition of the Harness.

475. *In garrison:* The harness is arranged on two pegs on the heel posts as follows:

On the upper peg: Both bridles hung from the peg by their headstalls; the traces of both horses hung over the peg close to the heel post; the off saddle with its attachments over the seat, the blanket across the saddle; both collars, unlocked, over the blanket.

On the lower peg: The near saddle and blanket arranged as prescribed for the off harness.

The pole yoke, with martingales attached, is hung from a spike driven into the side of the heel post.

To prevent injury to the off saddle when the blankets are kept out to be dried, the sack is put over the harness, and the collars are then placed across the sack.

476. *In the field:* The prop is placed under the end of the pole. The wheel traces are detached from the collars only, and laid back on the footboards. The remainder of the harness of the near wheel horse is placed on the pole next to the double tree, arranged as follows: The saddle with its attachments over it, the blanket across the saddle, the bridle and collar over the blanket. The remainder of the off wheel harness is placed next, then the swing and lead harness in the same order. The traces of the swing and lead harness, folded once, are placed across the saddle. The neck yoke is placed on the footboard.

To Harness.

477. A pair of quiet, well-trained horses, in a double stall, is assigned to each recruit, who should be supervised at first by a thoroughly instructed man.

The instructor causes a pair to be harnessed, points out and names the different parts of the harness and explains their uses; he then causes the harness to be taken off and replaced on its pegs.

478. The harness being on the heel posts, the instructor causes the recruits to ***stand to heel,*** and commands: 1. ***By detail,*** 2. ***HARNESS.***

Collar: Each driver puts on and locks the collar of his off horse, then that of his near horse.

Saddle: He puts on the blanket of the off horse, then the saddle with its attachments, taking care not to displace the blanket; buckles the collar strap to the saddle; turns back the back strap and, in the case of wheel drivers, the breeching, and fastens the crupper, and completes the saddling as explained in The Soldier Mounted. He then saddles the near horse in like manner.

Traces: He lays the middle of the trace of the off horse over the horse's back, behind the saddle, toggles on opposite sides, and, beginning with the off trace, passes the toggles through the loin loops from the rear and attaches them to the tugs on the collar. The traces of the near horse are then attached in the same manner. The rear ends of the traces are left hanging over the backs of the horses.

The traces are not attached when the horses are harnessed for drill by pair.

Bridle: He bridles the off horse, passes the reins through the roller, and secures the coupling rein to the manger. He then bridles the near horse.

Unless instructions to the contrary are given, the halters are removed before bridling.

Couple: He backs his pair out of the stall, places them side by side facing the stable exit, attaches the hook at the end of the coupling rein to the right pommel ring of the near saddle, and then stands to horse.

Yoke: The wheel driver takes down the yoke; places himself between his horses, facing in the same direction with them; fastens the breast strap of the off horse, then that of the near horse; passes the martingale of the near horse between the forelegs, through the standing loop on the cincha; attaches the hooks at the end of the side straps to the martingale D ring; secures the martingale of the off horse in the same manner; then passes out in rear of the near horse, and stands to horse.

To harness without detail: ***HARNESS.***

To Unharness.

479. 1. ***By detail,*** 2. ***UNHARNESS.***

Unyoke: The wheel driver passes between his horses from the rear, unhooks the martingale of his near horse, and draws the martingale through the standing loop on the cincha; then does the same with respect to the off horse; unhooks the inside end of each breast strap, detaches the neck yoke and hangs it on its spike.

Uncouple: Each driver steps in front of his horses, uncouples, leads them into the stall, and secures the coupling rein to the manger.

Unbridle: He unbridles the near horse, puts on the halter, fastens the halter strap to the manger, does the same with respect to the off horse and hangs the bridles on the upper peg, the near bridle next to the post.

Traces off: He disengages the near trace of the near horse and lays its middle over the saddle, toggle on the near side; disengages the off trace and lays it beside the near trace, toggle on the off side; removes the traces and hangs them on their peg. In like manner he removes and hangs up the traces of the off horse.

Unsaddle: He unsaddles the near horse as explained in The Soldier Mounted; unfastens the collar strap and crupper and places the attachments over the saddle; places the saddle and blanket on the peg. He then unsaddles the off horse in like manner.

Collar off: He removes the collar of the near horse, then that of the off horse, and hangs them up, the near collar next to the post.

To unharness without detail: ***UNHARNESS.***

To Harness and Unharness in the Field.

480. Executed as in garrison, with such modifications as the disposition of the harness requires. The horses are ordinarily tied by the halters to the wheels of the carriages while harnessing and unharnessing.

Fitting Harness.

481. When the recruit has become somewhat familiar with the method of harnessing and unharnessing, he will be instructed in fitting harness, the importance of which will be thoroughly impressed upon him.

The *bridle* and *saddle* are fitted as prescribed in The Soldier Mounted.

The ***collar,*** when adjusted, should freely admit the thickness of the hand between the lower part and the throat, and the fingers between the sides and the neck. A short collar chokes a horse by pressing on the windpipe; a narrow one pinches and rubs the neck. A broad collar works about and galls the shoulders.

The ***back strap,*** when adjusted, should admit the breadth of the hand between it and the horse's back.

The ***collar strap*** should not be tight; otherwise it will pull the saddle forward on the withers. The surcingle, when used, should be buckled on the near side of the near horse and on the off side of the off horse, less tight than the girth and over it.

The ***breech strap*** should be adjusted so that it will bear quickly when the horse is required to check the movement of the carriage, but will not impede his movement while in draft. This adjustment is most important. It can best be made by observing the horse in draft and tightening the straps as much as can be done without impeding the free movement of the animal while in draft.

The ***hip straps*** should be of such length that the breech strap will bear just below the point of the buttocks. The lower the breech strap is adjusted the less does it assist the horse in checking the movement of the carriage.

The ***loin straps*** should be so adjusted that the traces, when in draft, will be straight and without downward pull on the loops that support them.

The ***traces:*** The length of the traces must depend in a great measure on the size of the horse and his stride. For the wheel team, the rule is to allow about fourteen inches from singletree to hindquarters, and for swing and lead teams, about one yard from head to point of buttocks when in draft. The traces should be adjusted so that the line of traction will be straight from the singletree to the collars of the leaders. This rule will regulate, in some measure, the length of the loin straps, the matching of the horses, and the arrangement of the pairs in the team.

All rear trace chains have a ring at one end and a hook at the other; the hook is passed through the D ring at the end of the trace, and hooked back into any desired link. By this means, the length of the trace is adjusted, and the rear trace chain need not be removed except for cleaning.

To Lead Out.

482. To form the pairs after harnessing, the instructor indicates the place of formation and whether it is to be in line or column of pairs, and commands: ***LEAD OUT BY PAIR.***

The pairs are led out as explained in The Soldier Mounted, and formed at the place designated, as explained in paragraph 471.

To Mount and Dismount.

483. Being at a halt: 1. *Drivers, prepare to mount* (*dismount*), 2. ***MOUNT*** (***DISMOUNT***); or, 1. *Drivers,* 2. ***MOUNT*** (***DISMOUNT***).

Executed as prescribed for The Soldier Mounted, except that the horses are not moved out of ranks. The whip, if in hand, is hung on its ring before dismounting.

Management of a Single Pair.

484. The near horse is managed by the reins and the legs, as explained in The Soldier Mounted; the off horse by the bridle reins and the whip.

By kind and gentle treatment the two horses must be accustomed to work together evenly and to effect changes of gait and direction simultaneously. The off horse must be trained to conform to the movements of the near horse, especially in changes of direction, and neither to crowd the near horse nor to travel too widely from him. The coupling rein should be so adjusted as to prevent the off horse from drawing too far away from his mate. In the training of new horses the driver may make use of it to assist in turning the off horse to the right or left; but it should never be used to check his gait, as its use for this purpose has the effect of pulling the horse's head in and preventing him from traveling squarely.

The bridle reins are used for gathering the off horse, for checking his gait, for reining him back, and for halting him. The *lash* is habitually held in the left hand, between the thumb and the forefinger, and is adjusted so as to have a very light bearing on the bit.

When necessary to use the bridle reins of the off horse, the driver grasps the reins with the right hand at a suitable distance from the left, and draws the hand toward the right thigh;

the roller fastened to the off saddle, through which the lash passes, serves to transmit an equal tension to both reins.

With well-trained horses that work evenly, the whip is rarely necessary. It is ordinarily carried hooked to the right pommel ring of the near saddle; when taken from the ring, it hangs by its loop from the driver's right wrist, when not in use. The whip should be used only with sufficient force to produce the desired effect, and should never be applied about the horse's head or neck.

Both horses should be gathered before moving from a halt, before halting, and before changing gait or direction; the near horse, as explained in The Soldier Mounted; the off horse, by a slight additional pressure on the bit. The near horse is then required to move in the desired manner, or to halt; the off horse to conform to the movement of the near horse, the reins being used to check him; the whip, if necessary, to quicken his movements.

MARCHINGS.

To March to the Front.

485. 1. *Forward,* 2. *MARCH.*

Each driver moves his pair straight to the front, taking care to maintain his proper relative position in the formation.

To Halt.

486. Being in march: 1. *Drivers,* 2. *HALT.*

Each driver stops both horses, but not suddenly, and keeps his pair straight.

To March by the Flank.

487. 1. *By the right* (*left*) *flank,* 2. *MARCH.*

Each driver wheels his pair to the right by moving the off horse over a quarter circle whose radius is four yards, and causing the near horse to quicken his movements so as to keep abreast of the off horse. On the completion of the wheel, each driver moves his pair straight to the front in the new direction.

If executed from line, the pairs are in *column of pairs;* each driver conducts his pair so that the man who immediately precedes him will hide all the other men in front.

If executed from column, the pairs are in *line of pairs;* the pairs at once align themselves toward the guide and take their interval from his flank.

To March to the Rear.

488. 1. ***Right*** (***left***) ***about,*** 2. ***MARCH.***

Executed as explained for the march by the flank, except that each driver moves his pair over a half circle instead of a quarter circle.

If executed at a trot or a gallop, the radius is slightly increased and the gait moderated.

To March Obliquely.

489. 1. ***Right*** (***left***) ***oblique,*** 2. ***MARCH.***

Executed as explained for the march by the flank, except that each driver moves his pair over an eighth of a circle instead of a quarter circle. During the oblique march the drivers maintain their relative positions with respect to each other so that on executing a second oblique they will be in line or column, as the case may be, with proper intervals or distances.

To Change Direction in Column of Pairs.

490. 1. ***Column right*** (***left***), 2. ***MARCH.***

The leading driver marches by the flank: the other drivers march squarely up to the wheeling point and execute the change of direction on the same ground.

Column half right (***half left***) is similarly executed, the change of direction being 45 degrees instead of 90 degrees.

To Rein Back.

491. Being at a halt: 1. ***Backward,*** 2. ***MARCH,*** 3. ***Drivers,*** 4. ***HALT.***

Both horses are reined back evenly and kept straight. This movement is used only for the purpose of moving the horses a few steps to the rear.

Alignments.

492. Being in line at a halt, the instructor sees that the driver on the flank toward which the alignment is to be made is in the desired position and commands: 1. ***Right*** (***left***), 2. ***DRESS,*** 3. ***FRONT.***

At the command *dress,* the other drivers look to the right and align themselves accurately, keeping their pairs straight and preserving their intervals. At the command *front,* they turn their eyes to the front.

The instructor may place himself on either flank, and give a general alignment by ordering any driver to move one or both of his horses forward or backward.

To Dismiss the Drivers.

493. The instructor may conduct the drivers in column of pairs into the stable and halt the column so that each driver is opposite his stall; or he may first form the drivers in line of pairs in the vicinity of the stable or park, and command: 1. *By the right* (*left*), 2. *FILE OFF.* In the latter case the drivers file off in succession, as explained in The Soldier Mounted, and halt when opposite their stalls or the place designated for unharnessing.

The instructor then commands: *Unharness,* or *unharness by detail.*

The harness is removed, cleaned, and properly put in place; the horses rubbed down and cared for. Having satisfied himself by inspection that these duties have been properly performed and that all the precautions required on return from exercise have been observed, the instructor causes the harness to be covered, orders the men to *fall in,* marches them to the battery parade ground, and dismisses them.

SECTION IV.—*The team hitched.*

494. The drivers being well instructed in their individual duties in managing and maneuvering a single pair, their further instruction as lead, swing, and wheel drivers of a team hitched to its carriage is taken up.

495. The pairs assigned to the traction of a single carriage are termed collectively *a team.* A team usually consists of three pairs. The pair in front is called the *lead pair;* the one attached to the carriage, the *wheel pair;* the pair between these two, the *swing pair.* When there are two pairs between the lead and wheel pairs, they are called the *lead swing* and *wheel swing* pairs.

496. The instruction is described for teams hitched, and for convenience, a temporary section consisting of two carriages is considered. With obvious modifications, the instruction is applicable to a single team or to several sections, hitched or unhitched.

497. Training with the teams hitched is regarded as the rule; but when the ground is soft or otherwise unsuitable for drill with the carriages, the instruction may be had with teams unhitched.

To Hook Traces.

498. The teams being in column of pairs in proper order from front to rear, the instructor commands: 1. ***Hook,*** 2. ***TRACES.***

Each swing driver goes to the rear of his off horse, passing by his off side, and hooks the rear ends of the swing traces to the front ends of the corresponding wheel traces, beginning with the outer trace of the off horse and ending with the outer trace of the near horse.

Each lead driver in like manner hooks the rear ends of the lead traces to the front ends of the corresponding swing traces.

The traces may be hooked either before or after leading out.

To Unhook Traces.

499. 1. ***Unhook,*** 2. ***TRACES.***

Each swing driver backs his pair, if necessary, in order to unhook more easily. He then goes in rear of his horses, passing by the near side of the near horse, and detaches the swing traces from the wheel traces, beginning with the outer trace of the near horse and ending with the outer trace of the off horse. As each trace is unhooked, its end is placed over the back of the horse in rear of the saddle.

Each lead driver in like manner unhooks the lead traces.

The traces may be unhooked before or after leading into the stable.

To Lead Out.

500. The teams being harnessed, and traces hooked or unhooked, the instructor designates the place and order of formation, and commands: ***Lead out by team.*** The teams are led out in turn and formed in line or column of teams, as may be prescribed by the instructor.

If the teams are to be hitched at once, and the carriages are near by, the teams may be led directly from the stable to the carriages.

Disposition of the Carriages of a Section.

501. The carriages of a section are said to be in ***section column*** when one is in rear of the other, with a distance of two yards from the rear of the leading carriage to the heads of the lead horses of the following carriage; or, if unhitched, with a distance of eight yards from the rear of the leading carriage to the end of the pole of the following carriage. They are ordinarily parked in this formation.

They are said to be in ***flank column*** when abreast of each other at seventeen yards interval; and in ***double section*** when abreast of each other at two yards interval.

To Post the Teams with their Carriages.

502. The teams are marched to the park in column of teams, and directed so as to approach the flank and rear of the carriages. As the head of the column approaches the carriages the instructor commands: ***TEAMS TO YOUR POSTS.***

Each team, as it comes opposite its carriage, wheels from the column and proceeds to its carriage; having passed the front wheel, the drivers incline toward the pole and then move forward so as to place the team in proper position, the wheel driver causing the horse next to the pole to step over it, the front end of the pole resting on the ground.

To Hitch.

503. The traces being hooked: 1. ***Drivers,*** 2. ***HITCH.***

Each wheel driver dismounts, if mounted; passes behind the near horse; places himself between his horses, on the right of the pole; engages the end of the pole in the pole-yoke ring; then goes behind the off horse and attaches his traces to the singletree, beginning with the near trace. He then passes around the rear of the carriage at double time, and hitches the near horse, beginning with the off trace.

He then mounts, if mounted when the command was given; if dismounted, he stands to horse.

504. If cannoneers be present, the instructor may command: 1. ***Cannoneers,*** 2. ***HITCH.***

No. 1 at the piece and the highest odd-numbered cannoneer at the caisson, each engages the end of the pole of his carriage in the pole-yoke ring and hitches the near wheel horse; the gunner at the piece and the highest even-numbered cannoneer at the caisson, each hitches the off wheel horse of his carriage.

To Unhitch.

505. 1. ***Drivers,*** 2. ***UNHITCH.***

Each wheel driver dismounts, if mounted; detaches the traces of his near horse, and places the end of the traces over the horse's back behind the saddle, as prescribed for harnessing; passes around the rear of the carriage at double time and unhitches his off horse in like manner; passes between his horses, disengages the pole from the pole-yoke ring and lowers the pole to the ground. He then mounts, if mounted when the command was given; if dismounted, he stands to horse.

506. If cannoneers be present, the instructor may command: 1. ***Cannoneers,*** 2. ***UNHITCH.***

No. 1 at the piece and the highest odd-numbered cannoneer at the caisson each unhitches the near wheel horse of his carriage and disengages the pole; the gunner at the piece and the highest even-numbered cannoneer at the caisson each unhitches the off wheel horse of his carriage.

To Dismiss the Teams from the Park.

507. 1. ***By the right*** (***left***), 2. ***FILE OFF.***

The team of the leading carriage on the right flank moves by the right flank; the other teams follow in turn at two yards distance, teams of rear-rank carriages inclining toward the right so as to pass the front-rank carriages and enter the column behind their front-rank teams.

The teams may then be conducted to the stable and the drivers dismissed as explained in paragraph 493. If the traces are hooked the instructor gives the command ***unhook traces,*** before giving the commands for unharnessing.

Management of Teams in Draft.

508. In all movements from a halt, each driver gathers both of his horses just before they are to move; if in march and the gait or direction is changed, both horses are gathered just before they change the gait or direction. Care should be taken that all the horses of a team move off together and change the gait at the same time.

509. In starting a carriage, it is especially important that all the horses of the team should throw their weights into the collars gradually but simultaneously. To insure this, all traces must be stretched before the team moves. A common fault is to start one pair before the others are in draft, the tendency of which is to make the team balky. The swing driver should regulate his movements by those of the lead driver, and the wheel driver by the swing; the wheel driver must be especially careful that his pair neither lags nor attempts to start the carriage alone. Unremitting attention is required upon the part of every driver in the team, in order that each pair shall at all times do its proper share of the work.

By observing these important rules, a team is enabled to pull steadily together and the horses are not fatigued by jerks, which make them balky, gall their shoulders, and break the harness.

510. In reducing the gait or in halting, the movement must be checked gradually so as not to bring undue strains upon the horses or the harness. Ordinarily about two yards should be gained in bringing a carriage to a halt from a walk; in the exceptional cases when carriages are halted while moving at rapid gaits, from five to ten yards should be gained in halting from a trot; from ten to fifteen, in halting from a gallop.

The command for halting must be so given that the carriages may be properly brought to rest at the place desired.

511. The gaits are always changed ***gradually*** so as not to strain or worry the horses by sudden movements. In all cases whether moving from a halt, changing gait, or halting, the horses should be made to act together, but they should always be handled quietly and kindly, and allowed a sufficient time for their movements.

The wheel driver is responsible for checking the gait, and for halting or backing the carriage; the lead and swing drivers regulate the movements of their pairs by those of the wheel pair, keeping out of the way but avoiding any strain on the traces.

512. In all changes of direction the carriage is under the control of the wheel driver, who is responsible for its correct movements. The lead and swing drivers keep their traces stretched and aid in the draft as much as possible, but must be careful to avoid the tension that would pull the wheel pair out of its proper direction.

513. In executing the abouts, the countermarch, and the wheels, at a trot or gallop, the radius is sufficiently increased to permit the horses to execute the movement with ease; and in the abouts and the countermarch, the gait is moderated to avoid overturning the carriages.

MARCHINGS.

To March to the Front.

514. 1. *Forward,* 2. *MARCH.*

The teams move out simultaneously and march straight to the front. If in column they take the track and distance from the carriage ahead; if in line they preserve the alignment and the interval from the guiding flank.

To Halt.

515. 1. *Section,* 2. *HALT.*

Executed by each team as explained in paragraph 486. The traces are stretched as soon as the carriage is halted, by moving the horses a step or two forward.

To March by the Flank.

516. 1. *By the right* (*left*) *flank,* 2. *MARCH.*

Each lead driver wheels his pair to the right, as explained in paragraph 487. The swing and wheel drivers follow the lead, and wheel to the right on the same ground.

If executed from section column, the carriages are in flank column after the movement is completed, and a guide is at once announced. If executed from flank column, the carriages are in section column, and the rear carriage takes at once the track and distance from the carriage which precedes.

To March to the Rear.

517. 1. By an about: 1. *Right* (*Left*) *about,* 2. *MARCH.*

Each lead driver executes an *about,* as explained in paragraph 488. The swing and wheel drivers follow the lead, and execute the about on the same ground.

On the completion of the movement the carriage in rear quickly takes the track and distance from the carriage which now precedes in the movement.

518. 2. By a countermarch. The section being in section column: 1. *Countermarch,* 2. *MARCH.* The leading carriage of the section executes a left about as just prescribed; the rear carriage follows in the track of the leading carriage and executes a left about on the same ground.

To March Obliquely.

519. 1. ***Right* (*Left*) *oblique,*** 2. ***MARCH.***

Each lead driver executes an oblique as explained in paragraph 489. The swing and wheel drivers follow the lead, and execute the oblique on the same ground.

The carriages move on parallel lines, the lead drivers regulating their march so that, on executing a second oblique, they will have their proper relative positions in line or column, as the case may be.

To Change Direction.

520. 1. ***Right* (*Left*) *wheel,*** 2. ***MARCH.***

If in section column, the leading carriage wheels to the right as explained in paragraph 516; the rear carriage follows in the track of the leading carriage, and wheels on the same ground.

521. In flank column, the pivot carriage wheels to the right as explained in paragraph 516; the other carriage increases the gait one degree, preserving its interval from the pivot carriage, and takes the gait of the latter on arriving abreast of it.

522. The ***right*** or ***left half wheel*** is similarly executed in both cases.

To Form Flank Column from Section Column.

523. 1. ***Flank Column,*** 2. ***Right* (*Left*) *oblique,*** 3. ***MARCH.***

The rear carriage of the section obliques to the right and places itself abreast of the leading carriage at an interval of seventeen yards.

If executed from a halt or while marching at a walk, the leading carriage moves forward three carriage lengths and halts; the rear carriage halts on reaching its position. If executed while marching at a trot or gallop, the leading carriage reduces the gait to a walk or trot, as the case may be; the rear carriage takes the gait of the leading carriage on arriving abreast of it.

If the instructor announces an increased gait for the movement, the leading carriage maintains its gait; the rear carriage takes the increased gait, and takes the gait of the leading carriage on arriving abreast of it.

To Form Section Column to the Front from Flank Column.

524. 1. ***Piece* (*Caisson*) *front,*** 2. ***MARCH.***

The designated carriage moves straight to the front; the other carriage obliques toward the designated carriage in time to follow in its track at two yards distance.

If executed while marching and no increased gait is ordered, the designated carriage maintains its gait; the other carriage reduces its gait one degree, or halts if marching at a walk, and resumes the gait in time to follow the movement. If an increased gait is ordered, the designated carriage takes it at once; the other in time to follow the movement.

To Form Double Section and to Resume the Previous Formation.

525. Being in section column: 1. ***Double section,*** 2. ***Right* (*Left*) *oblique,*** 3. ***MARCH.***

The rear carriage of the section inclines to the right and places itself abreast of the leading carriage at an interval of two yards.

The rules for gaits are as prescribed for forming flank column from section column (par. 523).

526. To form again in section column: 1. ***Piece* (*Caisson*),** 2. ***Front,*** 3. ***MARCH.***

The designated carriage moves straight to the front; the other carriage inclines toward the designated carriage in time to follow in its track at two yards distance. The rules for gaits are as prescribed for forming section column from flank column (par. 524).

527. Being in flank column: 1. ***Double section,*** 2. ***Right* (*Left*) *oblique,*** 3. ***MARCH.***

The left carriage inclines sharply toward the right carriage, and moves up abreast of it at two yards interval. The rules for gaits are as prescribed for forming flank column from section column (par. 523), the right carriage conforming to what is prescribed for the leading carriage; the left carriage, to what is prescribed for the rear carriage.

528. To form again in flank column: 1. ***Flank column,*** 2. ***Right* (*Left*) *oblique,*** 3. ***MARCH.***

The right carriage inclines sharply away from the left carriage and then moves up abreast of it at seventeen yards interval. The rules for gaits are as prescribed for forming flank column from section column (par. 523), the left carriage conforming to what is prescribed for the leading carriage; the right, to what is prescribed for the rear carriage.

529. The section being formed in double section, retains that formation until again formed in section or flank column, and is maneuvered as if it were a single carriage. In executing the wheels, the abouts, and the oblique, the pivot carriage executes the movement as heretofore prescribed; the other carriage conforms to the movement of the pivot carriage, increasing the gait so as to arrive abreast of the latter without delay.

Passage of Carriages.

530. Being in section column, to place the rear carriage in front, the instructor commands: 1. ***Piece*** (***Caisson***), 2. ***Front,*** 3. ***MARCH.***

The carriage designated in the command is the rear carriage in the existing formation.

The designated carriage inclines to the right, passes the other carriage, takes position in front of it, and continues the march; the carriage then in rear follows at two yards distance.

If executed while marching and an increased gait is not ordered, the designated carriage maintains its gait; the other reduces the gait one degree, or halts if marching at a walk, and resumes the previous gait in time to follow at the proper distance.

If an increased gait is ordered the designated carriage takes it at once; the other takes it in time to follow at the proper distance.

Unlimbering and Limbering.

531. The drivers are practiced in the duties of unlimbering and limbering as prescribed in paragraphs 223, 224, 225, 228, and 229, cannoneers being posted with each carriage for the necessary handling of the gun and caisson body.

To Back the Carriages.

532. ***To the rear:*** Being at a halt, to move a short distance to the rear: 1. ***Backward,*** 2. ***MARCH,*** 3. ***Section,*** 4. ***HALT.***

The drivers rein back their horses, taking care to keep the pole straight; at the command ***halt,*** they stretch the traces and halt.

533. ***To the right or left:*** Being at a halt: 1. ***Right*** (***Left***) ***backward,*** 2. ***MARCH,*** 3. ***Section,*** 4. ***HALT.***

At the first command the drivers of each team swing the team to the right without advancing or backing the carriage until the limber wheel nearly touches the wheel-guard plate; at the command ***march*** they rein the horses back, taking care to keep them to the right; at the command ***halt*** they straighten the team and carriage and halt.

Whenever a carriage has to turn in a narrow space, as a street or lane, this method of backing is necessary, the carriage being halted when its rear part nearly touches the wall or fence, etc.

To Dismount the Drivers while Marching.

534. Being at a walk: 1. *Drivers,* 2. ***DISMOUNT.***

Each driver dismounts without checking the gait, places the bridle reins of his near horse over the pommel, and walks beside him without touching the reins, unless it is necessary to check his pair; if either one of his pair lags, he threatens him or touches him lightly, with his whip.

If the instructor commands: 1. *Lead and swing drivers,* 2. ***DISMOUNT,*** the drivers named alone dismount.

To Mount the Drivers while Marching.

535. Being at a walk: *Drivers,* 2. ***MOUNT.***

All the drivers who are dismounted mount without checking the gait.

If the instructor commands: 1. *Wheel drivers,* 2. ***MOUNT,*** the drivers named alone mount.

Marching with the drivers dismounted will be practiced over smooth, level ground at first until the teams are taught to pull together and to walk with an even, regular gait.

CHAPTER IV.—THE BATTERY MOUNTED.

SECTION I.—*Object and sequence of the instruction.*

536. The special object of this instruction is the training of the personnel of the battery in the dispositions and maneuvers requisite for getting the guns into position for action. Methods of training in opening and delivering fire have been laid down in Firing Instruction. The two kinds of training supplement each other and should be practiced concurrently.

537. A progressive order of instruction should be observed. The section and the platoon having each been instructed by its chief, the captain takes up and completes the training of the battery as a whole.

The captain requires the *section mounted* and the *platoon mounted,* properly manned, horsed, and equipped, to be instructed by their chiefs in accordance with the principles prescribed for the battery mounted. The exercises of these units, acting separately, are ordinarily elementary in their nature and preparatory to their combined work in the battery. Such exercises are accordingly executed with great precision and attention to detail.

On the ordinary drill ground the battery is practiced in maneuvering and in fire discipline so that the details of each are thoroughly understood and well performed by the personnel of the battery and so that the various units of the battery work together smoothly and effectively under the direction of the captain. Opportunities should then be sought for practice over all accessible kinds of ground to the end that the personnel may become accustomed to adapting the principles learned on the drill ground to the accidents of a varied terrain.

Frequent practice should be had in the selection of observing stations, the reconnaissance of targets, the selection of firing positions, advancing to and occupying firing positions, under different conditions, the determination of firing data for direct and indirect laying at fixed and moving targets, simulated fire, etc. This practice should approximate the conditions of war as nearly as possible.

SECTION II.—*General provisions.*

538. All men of the battery should be instructed in the duties of both the cannoneer and driver.

539. In order that all the horses may be available in an emergency for any place in the battery, the team horses should be taught to work in the lead, swing, and wheel pairs; and on both the off and near sides. Saddle horses should occasionally be worked in harness, and team horses used as saddle horses.

540. During instruction, the saber is in the scabbard or drawn, at the discretion of the captain. When the captain draws saber, the chiefs of platoon also will draw saber.

At mounted instruction, the saber is habitually attached to the left side of the saddle; on dismounting for fire action, it is not removed.

541. Unless otherwise stated, the text refers to light batteries. With necessary modifications in distances, and in the duties of cannoneers, it becomes equally applicable to horse batteries.

Special directions are given when the gun squads of horse batteries have to make any particular movement. When the gun squads are not mentioned, they have only to maintain their posts in rear of their caissons, dressing toward the side of the guide. In section column, the guide of each gun squad is without indication to the right. When flank column or double section column is formed, the gunners form their squads on the outer flank of the caisson, the cannoneers of the front rank aligned on the axle of the limber.

542. A ***gun section*** consists of a gun and its caisson, manned, horsed, and equipped.

A ***caisson section*** consists of two caissons, manned, horsed, and equipped.

The leading caisson of each caisson section in the normal order in park is called the ***first caisson;*** the other is called the ***second caisson.*** With obvious modifications, what is prescribed in the text for pieces and caissons of gun sections applies to first and second caissons of caisson sections, respectively.

543. The rests are executed and the attention is resumed according to the principles already explained.

SECTION III.—*Organization of the Battery.*

544. On a war footing, the battery is organized in nine sections.

The first, second, third, and fourth sections are gun sections.

The fifth, sixth, seventh, and eighth sections are caisson sections.

The ninth section comprises the forge, the store wagon, the two kit wagons, and the allotted ration and forage wagons.

The first and second sections constitute the first platoon. It is commanded by the senior lieutenant.

The third and fourth sections constitute the second platoon. It is commanded by the lieutenant second in rank.

The fifth and sixth sections constitute the third platoon. It is commanded by the lieutenant third in rank.

The seventh and eighth sections constitute the fourth platoon. It is commanded by the lieutenant fourth in rank.

The ninth section is commanded by the quartermaster-sergeant.

545. On subdivision for action, the battery is divided into the ***firing battery,*** the ***reserve,*** and the ***train.***

The firing battery comprises the first five sections. It is under the immediate command of the captain.

The reserve comprises the sixth, seventh, and eighth sections; the store wagon; the reserve men and horses, and at least one pair of harnessed wheel horses and one pair of harnessed lead horses. It is commanded by the junior lieutenant, who is assisted by the stable sergeant.

The train comprises the forge, the kit wagons, and the ration and forage wagons. It is commanded by the quartermaster-sergeant.

546. On a peace footing, the seventh and eighth sections are not manned or horsed. With this exception, the personnel, animals, and matériel allowed on a peace footing are organized as prescribed for the war footing, the captain making such assignments as may be necessary to replace personnel not authorized on a peace footing.

547. The ***Battery of Maneuver*** is ordinarily composed of the first, second, and third platoons, manned, horsed, and equipped. The instruction, however, is applicable to a greater or less number of platoons. For the training of horses and drivers, the entire battery is practiced in marching and maneuvering; before taking the ***order in battery,*** however, the battery is subdivided for action, the fifth section forming part of the firing battery, the sixth section representing the reserve.

548. The personnel of the battery of maneuver comprises the captain, four lieutenants, the first sergeant, six chiefs of section, four gun squads, two caisson squads, the musicians, the guidon, and a driver to each pair of horses.

SECTION IV.—*Duties of officers, noncommissioned officers, etc.*

549. The ***captain*** commands the battery and is responsible for its training and efficiency.

The ***lieutenants*** command platoons and are responsible to the captain for the efficiency of the men, and the serviceable condition of the animals and matériel of their platoons.

The ***first sergeant*** is assistant to the captain, and is responsible to him for the general good order, police, and discipline of the battery. In action he supervises the replacement of ammunition and casualties, and has charge of the limbers.

The ***quartermaster sergeant*** is responsible to the captain for the general care and maintenance of the Government property issued to the battery.

The ***stable sergeant*** is responsible to the captain for the general care of the public animals assigned to the battery, and the good order and police of the stables, picket lines, etc.

The ***chief mechanic*** is responsible to the captain for the good order and repair of the matériel in actual use by the battery; for this purpose he has general supervision of the battery mechanics.

The ***sergeants*** command sections and are responsible to the chiefs of platoon for the efficiency of the men, and the serviceable condition of the animals and matériel of their sections.

The ***gunners*** are responsible to their chiefs of section for the good order of their guns, carriages, limbers, and equipment.

The ***caisson corporals*** are responsible to their chiefs of section for the good order of their caissons, equipment, etc.; also for the serviceable condition of the caisson teams, harness, equipment, etc.

The drivers are directly responsible to their chiefs of carriage for their horses, harness, and equipment.

It is the duty of both drivers and cannoneers to report at once to their chiefs of carriage any injury to their horses or matériel, or any deficiency in their equipment.

550. The captain, lieutenants, sergeants, caisson corporals, drivers, guidon, and musicians are mounted.

The cannoneers are on foot or mounted on the carriages, at the discretion of the captain; they are not ordered to mount or dismount when the battery is marching at a trot or gallop.

On the march in the field, the cannoneers are usually mounted on the chests, axle seats, and off horses, for rapid movements only.

In horse batteries, everyone is mounted; the cannoneers, except the horse holders, dismount to serve the guns.

SECTION V.—*Formations of the battery and posts of individuals.*

Formations.

551. The habitual formations are the ***order in line***, the ***order in section column***, the ***order in flank column***, and the ***order in battery***.

552. The ***order in line*** is that in which the sections of the battery are formed abreast of each other in the order, or the reverse order, of their numbers from right to left. The carriages are limbered, and in each section are in section column, the pieces being either in front or in rear of their caissons. In the normal order in ***park*** the pieces are usually in front.

If the carriages of each section are in double section, the formation is called a ***double section line.***

553. The ***order in section column*** is that in which the sections of the battery follow each other in the order, or the reverse order, of their numbers, from front to rear. The carriages are limbered, and in each section are in section column, the pieces being either in front or in rear of their caissons.

If the carriages of each section are in double section, the formation is called a ***double section column.***

554. The ***order in flank column*** is that in which the sections of the battery follow each other in the order, or the reverse order, of their numbers, from front to rear. The carriages are limbered, and in each section are in flank column, the caissons being all either on the right or left of their pieces.

555. The ***order in battery*** is that in which the pieces and caissons of the gun sections, unlimbered for action, are placed in line in the order, or the reverse order, of their numbers, from right to left; the caissons of the fifth section, unlimbered, one on each flank of this line; and the limbers either in rear of their unlimbered carriages, or formed at such other place as the captain may direct.

The reserve, consisting of such other caissons, etc., as may be present, is posted at the discretion of the captain.

556. ***In line*** and in ***flank column,*** the normal interval between carriages, measured between adjacent wheels, is seventeen yards. In the ***order in battery,*** the interval is the same, but is measured between adjacent wheels of gun carriages.

557. In column or in line, the distance between two carriages, or between a carriage and a mounted squad, is two yards, except that in flank column the distance between caissons is four yards; and, in line, when the pieces lead, the distance between caissons of the caisson sections is four yards. In battery, when the limbers take post in rear of their carriages, the distance between the line of pieces and the limbers is twenty-five yards, measured from the rear of the caissons to the heads of the lead horses.

558. When the teams have but two pairs of horses, the intervals are diminished three yards; should the teams have four pairs, the intervals are increased three yards.

If any carriage has lost one pair of horses, or more, it has the same position as if the team were complete.

559. *Posts of*

Individuals.	Order in line.	Order in section column.
Captain	8 yards in front of the battery, opposite the center.	Opposite the center of the column and 15 yards from the left flank.
Platoon commander.	Halfway between his sections and in line with the lead drivers of his leading carriages.	Opposite the center of his platoon, 4 yards from the left flank.
First sergeant.	Halfway between the center sections, opposite the rear of the rear carriages.	Opposite the center of the battery, 4 yards from the right flank.
Chief of section.	Boot to boot with the lead driver of his leading carriage.	Same as in line
Caisson corporal.	Boot to boot with the lead driver of his caisson; but if the chief of section is posted with the caisson, then boot to boot with the swing driver.	Same as in line
Guidon	Abreast of the guide of the battery, and 2 yards to his left. Before leaving park, 4 yards from the right flank of the battery aligned on the lead drivers.	Abreast of the leading guide of the battery, and 2 yards to his left.
Musicians	Boot to boot with each other, 2 yards in rear of the captain.	Same as in line

560. The members of the gun squad are posted as explained in paragraphs 200 and 209. In horse batteries, the post of the gun squad with the carriages limbered is two yards in rear of the caisson. When the carriages are unlimbered, the horse holders, with the horses of the squad, take post two yards in rear of the caisson limber.

561. When the quartermaster and stable sergeants are present with the battery of maneuver, they are posted boot to boot in order of rank from right to left, as follows: In line, four yards from the left flank of the battery, abreast of the lead drivers; in battery, four yards from the left flank of the line of limbers, abreast of the lead drivers; in section or flank column, they are either four yards in rear of the last section, or four yards in front of the leading section, according as the column has been formed toward their flank of the battery or *individuals.*

Order in flank column.	Order in battery.
Opposite the center of the column and 15 yards from its flank; on the left when the first section leads, and on the right in the reverse order.	Halfway between the two center sections, 10 yards in rear of the line of the trail spades.
Halfway between the pieces and caissons, and in line with the lead drivers of his leading carriages.	Halfway between the guns of his platoon, and 5 yards in rear of the line of the trail spades.
Opposite the center of the column and 4 yards from its flank; on the right when the first section leads, and on the left in the reverse order.	Halfway between the two center sections, 20 yards in rear of the line of the trail spades.
Boot to boot with the lead driver of his piece. In *double section* he has the same post.	2 yards in rear of his caisson and opposite its center.
Boot to boot with the lead driver of his caisson.	Same as in line.
Abreast of the guide of the battery, and 2 yards to his left.	At inspection, 4 yards from the right flank of the line of limbers abreast of the lead drivers. At other times with the reserve.
Same as in line	Same as in line. At inspection, on the right of the guidon, all boot to boot.

the flank opposite. In the reverse order in line and in battery, they do not change to the opposite flank.

562. Mechanics, cooks, etc., when present with the battery of maneuver, are assigned posts and duties as members of gun or caisson squads.

563. The posts designated in the foregoing table are the typical ones. The captain, however, goes wherever his presence is required, where he may best observe, and where his commands may best be heard. The lieutenants leave their posts if it is necessary for the purpose of supervising the work of their platoons. The chiefs of section habitually maintain their posts during the maneuvers of the battery; but during the practice of fire discipline, during road marches, and at other times when necessary, they leave their posts in order to supervise the work of their sections.

SECTION VI.—*The park.*

Disposition of the Carriages in Park.

564. The carriages are ordinarily arranged in park in the order in line, the sections arranged from right to left in the order of their numbers, the pieces in the front rank. The interval between adjacent carriages may be either the normal interval of seventeen yards or such interval as the captain may direct; the distance between the ranks of carriages is eight yards, measured from the rear of the front rank carriage to the end of the pole of the rear rank carriage.

The forge and the store, kit, ration, and forage wagons are parked on the left in the same formation as the other carriages, or in a third rank, as may be prescribed by the captain.

To Form the Battery in the Park.

565. The battery, dismounted, being formed on the battery parade, the first sergeant commands: ***Drivers fall out.***

The chiefs of section, caisson corporals, guidon, musicians, and drivers step six yards to the front and form facing to the front in double rank opposite the center of their respective sections; the chiefs of section place themselves in front, and the caisson corporals in the line of file closers, of the squads thus formed. The first sergeant sees that suitable cannoneers are detailed to replace absent drivers (not counting the men on guard or other duty, who join their teams at the stable or picket line), closes the drivers toward either flank, and directs the senior chief of section to march them to the horses.

On arrival at the stable or picket line, the chief of section in charge halts the drivers and commands: ***Harness.*** The drivers fall out and harness under the supervision of their respective chiefs. Chiefs of section and other mounted men not drivers saddle their horses while the drivers harness.

The drivers having been marched off, the first sergeant forms the gun squads and directs the senior gunner to march them to the park. The senior gunner posts the squads with their carriages and causes the paulins to be removed, folded, and strapped on the chests.

If the carriages are in a gun shed, the column is halted in front of the building, the senior gunner gives the necessary directions for the formation of the park, and commands: ***Form park.***

The cannoneers fall out, the carriages are run out by hand and formed in park.

The park being in order, the senior gunner commands: 1. ***In front*** (***rear***) ***of the pieces*** (***caissons***), 2. ***FALL IN.*** He sees that members of the guard and other cannoneers who have joined at the park are properly assigned, requires the squads to call off, and posts the cannoneers with their pieces. While waiting for the teams to arrive in park, the senior gunner may cause the cannoneers to rest or to fall out. Upon the arrival of the teams, he causes the cannoneers to resume their posts at attention.

When the horses are harnessed the first sergeant commands: ***Lead out by team.*** The sections lead out in turn and form in column. The first sergeant mounts the drivers, conducts the column to the park, posts the teams with their carriages, and causes them to be hitched.

If the park is near by, the captain may direct that the teams of each section, as soon as harnessed, be led out, posted with their carriages, and hitched, under the direction of their chiefs of section. In this case the senior chief of section, on the arrival of the drivers at the stables, commands: ***Harness and hitch.***

In all cases the first sergeant sees that the cannoneers perform their duties in the park, and that the drivers harness, lead out, and hitch with the least practicable delay and without noise or confusion.

566. In the field when the horses are harnessed at the carriages, the duties are performed in a similar manner. The senior chief of section, on the arrival of the drivers at the picket line, commands: ***Harness and hitch.*** The teams are hitched by the drivers, under the direction of their chiefs of section, according to the methods heretofore prescribed.

567. In ***horse batteries*** as soon as the park is formed and the carriages made ready for use, the senior gunner directs the gunners to march their squads to the horses and have the horses saddled.

The squads may be required to lead out with the teams of their sections. In this case they form in rear of the teams and are marched to the park with them, each gunner posting his squad in rear of its caisson as the teams of the section are being posted with their carriages.

If the squads are not ready when the teams are harnessed, the first sergeant may direct that the teams be led out and posted as above prescribed; when ready each squad is then led out and formed by its gunner, marched to the park, and posted.

568. The quartermaster and stable sergeants, if present, and the guidon take their posts during the hitching. The musicians report to the captain at such time and place as he may direct. The chiefs of platoon join their platoons as soon as the teams are posted with the carriages and superintend the hitching.

569. Each chief of section, as soon as his teams are hitched, makes a minute inspection of his section and reports the result to his chief of platoon.

570. Each chief of platoon, having received the reports of his chiefs of section and made a general inspection of the platoon, commands: ***REST.***

571. Upon the approach of the captain the chiefs of platoon call their platoons to attention, and as soon as the captain takes his place in front, report in succession from right to left: *(Such) platoon in order, sir;* or if anything be missing or out of order they so report.

As soon as the chiefs of platoon have reported, the first sergeant reports to the captain, as prescribed in paragraph 121.

572. The battery is unparked and parked by appropriate maneuvers. (See Section IX—The Battery Mounted.)

To Dismiss the Battery.

573. As soon as the battery is parked each chief of section makes a minute inspection of his section and reports all losses or injuries to the chief of platoon; the chiefs of platoon then report in succession from right to left: *(Such) platoon in order, sir;* or if anything be missing or out of order they so report.

The reports having been made, the captain gives such instructions as may be necessary, and directs the first sergeant: *Dismiss the Battery.* The officers return saber, if drawn, and fall out.

The first sergeant commands: 1. *Drivers,* 2. ***UNHITCH;*** or, 1. *Cannoneers,* 2. ***UNHITCH.***

The quartermaster and stable sergeants and the guidon leave the park and return their horses to the stable or picket line; the gunners cause their cannoneers to clean and cover or put away their guns and carriages, as may be directed by the first rgeant.

The teams being unhitched, the first sergeant commands: 1. ***By the right*** (***left***), 2. ***FILE OFF.***

The teams file off in the order of their sections, as explained in paragraph 507. The first sergeant marches the column to the stable and commands: ***FALL OUT.*** Each chief of section conducts his section to its proper place in the stable, and gives the necessary commands for dismounting the drivers, unhooking traces, and unharnessing. The drivers unharness under the supervision of their chiefs; the horses of the chiefs of section and caisson corporals are unsaddled while the drivers unharness.

As soon as the drivers have cared for their horses and harness, the first sergeant directs the senior chief of section to march them to the battery parade ground and dismiss them.

As soon as the cannoneers have cared for their carriages, the first sergeant directs the senior gunner to march them to the battery parade ground and dismiss them.

If the stable and park are too far apart for the first sergeant to superintend both the drivers and cannoneers, the captain gives such instructions as he desires.

574. In the field, when the horses are unharnessed at the carriages, the duties are performed as above described, except that the first sergeant, when directed to dismiss the battery, commands: 1. ***Drivers,*** 2. ***UNHITCH AND UNHARNESS.***

The teams are unhitched and unharnessed by the drivers under the direction of their chiefs of section, according to the methods heretofore prescribed, the horses being tied to the picket line as soon as unharnessed.

575. In ***horse batteries,*** while the drivers are unhitching the senior gunner forms the squads in column of twos, marches them to the stable and commands: ***FALL OUT.*** Each gunner conducts his squad to its place in the stable, and causes the cannoneers to unsaddle and care for their horses and equipments; he then marches his squad back to the park and causes the cannoneers to care for their carriages.

SECTION VII.—*Route marches.*

576. The section column is the habitual column of route; the distance between carriages is two yards, but may be increased to four yards when the ground is difficult.

Being in march: ***ROUTE ORDER,*** or ***AT EASE.***

Executed according to the principles already prescribed.

Sabers are returned, if drawn.

To resume the attention, the captain commands: 1. ***Battery,*** 2. ***ATTENTION.***

The captain usually marches at the head of the column, fifteen yards in front of the lead horses of the leading carriage. The musicians, marching side by side, follow the captain at two yards distance.

The chiefs of platoon habitually march opposite the rear carriage of their platoons and superintend their march, going wherever their presence may be required.

The chiefs of section leave their posts whenever necessary to superintend the march of their sections.

The stable sergeant has charge of the reserve horses and the men assigned to their care; he ordinarily marches with them immediately behind the rear platoon.

The ninth section ordinarily marches at the rear of the column.

577. In ***horse batteries*** the gunners, whenever necessary, form their squads in column of files, re-forming line as soon as the ground permits.

578. To avoid dust, the captain may direct the officers and noncommissioned officers to march on the windward side of the column. For similar reasons the cannoneers may be permitted to march on the right or left, to take advantage of a footpath, etc.

When the road is fairly good the drivers and horses may be rested by dismounting the drivers. Before going down hill and over rough parts of the road, the wheel drivers should mount without command, dismounting again when on the level or when the rough place is passed.

The cannoneers of horse batteries may also be dismounted, each cannoneer retaining hold of the reins and walking by the side of his horse.

Constant attention should be given by each officer and chief of section in order to insure the proper handling of every team and the correct adjustment of harness. They should see that each team horse does his share of the work, that no horse is overworked or overheated, that distances are preserved, and that no carriage, while in the column, moves at a different gait than that ordered. No practice is more fatiguing and injurious to horses than the alternate trotting and walking so often seen at the rear of a column.

SECTION VIII.—*Commands, signals, etc.*

Commands.

579. Commands are given by the captain either verbally, by bugle signals, or by signals made with the arm.

When verbal commands are given by the captain, they may be supplemented by the appropriate bugle or arm signals.

580. Chiefs of platoon repeat the commands of the captain, or give appropriate commands to their platoons in time to insure the proper execution of the maneuver. The chiefs of platoon ordinarily give their commands verbally, supplemented, if necessary, by the appropriate arm signal, and see to it that the commands of the captain are understood and correctly executed by their platoons. If a chief of platoon does not hear a command, he governs himself by what he sees executed by the adjoining platoon.

581. Chiefs of section repeat the commands of the chiefs of platoons, or give appropriate commands to their sections in time to insure the proper execution of the maneuver. Chiefs of section ordinarily give their commands by signals with the arms, supplemented, if necessary, by verbal commands, and see to it that the command is understood, and that it is correctly executed.

Arm Signals.

582. Signals are ordinarily made with the right arm, but may be made with the left arm when more convenient; when made with the left arm the reins are taken temporarily in the right hand.

If the saber is in hand, the signals are made in a manner similar to that prescribed for the arm.

583. Ordinarily, before making a signal for the execution of a movement, the captain places himself where he can be seen by the battery, generally with his horse facing in the same direction as the team horses, and commands or signals the ***attention*** or causes it to be sounded on the bugle. The captain may signal the attention by blowing a long blast on a whistle.

The signals prescribed for the different maneuvers are ***preparatory*** signals; for the signal of ***execution,*** the arm is extended vertically and then lowered quickly to the side. If the movement involves a change in the direction of march, the captain moves his horse in the new direction on making the preparatory signal.

584. ***Preparatory signals:***

Attention. Extend the arm vertically and move it slowly back and forth from right to left.

Forward. Extend the arm vertically and lower it to the front until horizontal.

By the right (left) flank. Extend the arm vertically and lower it to the right (left) until horizontal.

Right (Left) about. Extend the arm vertically and describe slowly a large horizontal circle with the hand; then extend the arm to the left (right) and describe a horizontal arc to front and right (left).

Countermarch. Extend the arm vertically and describe quickly several horizontal circles with the hand.

Right sections forward. Extend the arm vertically and then thrust several times to the front.

Right (Left) oblique. Extend the arm obliquely upward to the right (left) and front, and then lower the arm describing a vertical circle on the right (left) side of the horse.

To increase the gait. Carry the hand to the shoulder, forearm vertical; extend the arm vertically from this position and repeat several times.

To decrease the gait. Hold the arm horizontally above and in front of the forehead.

To indicate an increased or decreased gait for a maneuver, the appropriate signal is made just after the preparatory signal for the maneuver.

To halt. Extend the arm vertically and hold it there until the signal is obeyed.

To change direction to the right (left). Extend the arm vertically; lower it to the left (right) until horizontal and describe a horizontal arc to the front and right (left).

To close intervals. Point to the section on which the intervals are to be closed, and then signal right (left) oblique, or left and right oblique, according as the intervals are to be closed on the right (left) section or on an interior section.

To extend intervals. Point to the section on which intervals are to be extended, and then signal left (right) oblique, or right and left oblique, according as the intervals are to be extended on the right (left) section or on an interior section.

Right* (*Left*) *by section. Point at the right (left) section and signal forward.

Right* (*Left*) *front into line. Extend the arm vertically and describe several large vertical circles on the right (left) side of the horse.

Right* (*Left*) *into line. Signal a change of direction to the right (left), followed by describing small circles with the hand while the arm is extended to the right (left).

Pieces front. Extend the arm horizontally to the front and then move it several times through a small vertical arc.

Caissons front. Extend the arm horizontally to the front and then move it several times through a small horizontal arc.

Flank column, right* (*left*) *oblique. Extend the arm horizontally to the right (left) and then move it several times through a small horizontal arc.

Double section, right* (*left*) *oblique. Extend the arm horizontally to the right (left) and then move it several times through a small vertical arc.

The signals for ***flank column,*** or ***double section, right* (*left*) *oblique,*** apply also for the formation of flank column or double section, to the right (left) after limbering.

***Action front* (*right, left, rear*).** Extend the arm vertically; then lower quickly to the front (right, left, rear), and repeat several times.

Limber front and rear. Extend both arms laterally.

Limber rear. Extend both arms vertically.

SECTION IX.—*Maneuvers of the Battery.*

GENERAL PROVISIONS.

Guides.

585. The guide of a carriage is its lead driver; of a section in section column, the lead driver of its leading carriage; of a section in double section, the lead driver of its left carriage.

Chiefs of section supervise the gait and direction of march of their sections.

In section column, the guide of the leading section is the guide of the battery.

586. The guide of the battery in line is the guide of the right, left, or center section.

587. The guide of the battery in flank column is the guide of the leading carriage on one flank or the other.

588. During an oblique march the guide of the battery is, without indication, the guide of the leading carriage on the side toward which the oblique is made.

589. On leaving park the guidon at once posts himself with the guide of the battery. If a subsequent maneuver places the guidon at the rear of a section column, he hastens to post himself with the guide of the leading section; if with a rear carriage in line or in flank column, he hastens to post himself with the guide of the leading carriage nearest his former position, or takes the post with the indicated guide in case a guide is announced. On the formation of double section the guidon posts himself with the left carriage of the guiding section. During an oblique march the guidon does not change position.

590. With the exception just noted, the guide is habitually toward the guidon; while he is changing position, it is toward the guide with whom he is to take post.

591. The captain may announce or change the guide thus: ***Guide*** (***right, left,*** or ***center***).

592. If the captain desires, he may place himself in front of any carriage of the battery, and command: ***Guide on me.*** The carriage in rear of the captain then follows his movements and the others guide on this as the directing carriage, regulating their march and gait so as to maintain their proper relative positions. The guidon posts himself with the directing carriage.

Gaits.

593. In changes of formation, the carriages which establish the direction and rate of march of the new formation are termed ***directing carriages.***

594. The following rules govern the gaits during changes of formation:

Movements from Column into Line, and Analogous Movements.

Rule I. When a change of formation requires certain carriages to gain ground so as to reach specified positions abreast of the directing carriages, the captain may or may not announce an increased gait for the movement. If he announces an increased gait, the directing carriages maintain their gait; the other carriages move at the gait announced until they have reached their ew position, when they take the gait of the directing carriages.

If the captain does not announce an increased gait, the directing carriages reduce their gait one degree; the others maintain their gait until they reach their new position, when they take the gait of the directing carriages. If the movement is executed from a halt or while marching at a walk, and an increase of gait is not ordered, the directing carriages advance three carriage lengths toward the front of the new formation and halt.

This rule applies to forming line from column, double section line from line, flank column from section column or double section column, double section column from section column or flank column, and closing or extending intervals.

Movements from Line into Column, and Analogous Movements.

Rule II. When a change of formation requires the directing carriages to gain ground in order to precede the other carriages, the captain may or may not announce an increased gait for the movement. If he announces an increased gait, the directing carriages take the increased gait at once, the other carriages take it up so as to follow the movement in their proper order.

If the captain does not announce an increased gait, the directing carriages maintain their gait, the others reduce the gait one degree, and take the gait of the directing carriages in time to follow the movement in their proper order. If the movement is executed from a halt, or while marching at a walk and an increase of gait is not ordered, the directing carriages move at a walk; the others remain halted, or halt and take up the gait of the directing carriages as before.

This rule applies to forming column from line, line from double section line, section column from flank column or from double section column, and passage of carriages.

595. Reducing the gait ***one degree*** is to be understood as passing from the gallop to the trot, from the trot to the walk, or from the walk to the halt.

Increasing the gait ***one degree*** is to be understood as passing from the halt to the walk, from the walk to the trot, or from the trot to the gallop.

To Align the Battery.

596. The battery being in line at a halt:

If the section on the side toward which the alignment is to be made is not in proper position, the captain establishes it in the position desired, and commands: 1. ***Right*** (***Left***), 2. ***DRESS***, 3. ***FRONT***.

At the command ***dress*** the other carriages move forward or backward, preserving their intervals; the drivers cast their eyes to the right and dress on the drivers of the carriages established as a basis of alignment. The captain places himself on the right flank in line with the wheel driver of the base carriage, facing to the left; he quickly establishes the wheel driver of the leading carriage of the second section on the desired line, and then superintends the alignment of the other wheel drivers of the front-rank carriages. The first sergeant similarly superintends the alignment of the wheel drivers of the rear-rank carriages. The captain commands ***front*** when the alignment is complete, at which command the captain and first sergeant resume their posts and the drivers turn their eyes to the front.

597. In horse batteries, at the command ***dress*** each gun squad aligns itself toward the side ordered, under the supervision of its gunner.

To March to the Front.

598. 1. ***Forward***, 2. ***MARCH***.

Executed simultaneously by all the carriages, as explained in The Driver.

To Halt.

599. 1. ***Battery***, 2. ***HALT***.

Executed simultaneously by all the carriages, as explained in The Driver.

To March by the Flank.

600. 1. ***By the right*** (***left***) ***flank***, 2. ***MARCH***.

Executed simultaneously by all the carriages, as explained in The Driver, the rear carriages quickly taking the track and distance from the carriages which precede them in the new formation.

601. If the battery is in line, with closed intervals, the following modifications apply: The movement is successive; the section on the indicated flank begins the movement; the others take it up in turn so as to follow, at the proper distance, in the track of the carriages which precede them. If executed while marching, all the sections except the one on the indicated flank halt, and then resume the march so as to follow in their proper places in the column.

To March to the Rear.

602. By an about: 1. ***Right*** (***left***) ***about,*** 2. ***MARCH.***

By a countermarch: 1. ***Countermarch,*** 2. ***MARCH.***

Executed simultaneously by all the sections, as explained in The Driver.

In line or in double section line, these movements are not ordinarily executed at the gallop.

603. If the battery is in line with closed intervals, the following modifications apply: The captain first commands: 1. ***Right sections forward,*** 2. ***MARCH.*** The right section of each platoon moves forward so as to clear the left section. If the captain orders an increased gait for the maneuver, the right sections take the gait indicated; if an increased gait is not ordered, the left sections reduce the gait one degree, or, if halted, they remain halted. As soon as the right sections are clear of the left sections, the captain gives the command for the about or the countermarch, which is executed by all the sections at the gait of the right sections. On the completion of the about or countermarch, the sections in rear increase the gait so as to reach their positions in line.

604. In horse batteries, in executing an about, if the pieces are in front, they reduce the gait slightly so as to follow the gun squads at two yards distance; if the caissons are in front, they increase the gait slightly on completing the about, so as to follow the pieces at two yards distance.

To March Obliquely.

605. 1. ***Right*** (***Left***) ***oblique,*** 2. ***MARCH.***

Executed simultaneously by all the carriages, as explained in The Driver. The carriages move on parallel lines. The lead drivers align themselves in each rank of carriages; the lead driver of each rear rank carriage also aligns himself upon the lead driver of the carriage corresponding to his own in the front rank. If these positions are properly maintained, the carriages should, on executing a second oblique in either direction, have the proper distances, intervals, and alignment.

To Change Direction.

606. Being in section column or in flank column: 1. ***Column right*** (***left***), 2. ***MARCH.***

The leading section wheels to the right, as explained in The Driver (pars. 520 or 521); the sections in rear follow the leading section and wheel on the same ground.

Column half right (*half left*) is similarly executed.

607. Being in line: 1. *Battery right* (*left*) *wheel,* 2. ***MARCH.***

The pivot section wheels to the right, as explained in The Driver. The other sections increase the gait one degree, preserving their intervals from the pivot section, and take the gait of the latter on arriving abreast of it.

If executed while marching at the gallop, the sections other than the pivot section increase the gait without urging their horses too much.

Battery right half (*left half*) *wheel* is similarly executed.

To Execute a Passage of Carriages.

608. Being in line or in column of sections, to place the rear carriages in front: 1. *Pieces* (*Caissons*) *front,* 2. ***MARCH.***

Executed simultaneously by all the sections, as prescribed in The Driver.

Rule II governs the gaits.

To Close or Extend Intervals in Line.

609. 1. *On* (*such*) *section,* 2. *Close* (*Extend*) *intervals,* 3. ***MARCH.***

The normal closed interval is eight yards; the normal extended interval is seventeen yards. If the captain desires greater or less intervals to be taken, he announces the interval before giving the second command; for example: 1. *On first section,* 2. *To twenty yards,* 3. *Extend intervals,* 4. ***MARCH.***

The indicated section moves straight to the front; the other sections incline toward or away from the indicated section and move to the front when at the proper interval.

Rule I governs the gaits.

To Form Section Column to the Front from Line.

610. 1. *Right* (*Left*) *by section,* 2. ***MARCH.***

The right section moves straight to the front. The other sections, in turn, wheel to the right and follow in the column at two yards distance.

Rule II governs the gaits.

To Form Line from Section Column.

611. *To the front:* 1. ***Right*** (***Left***) ***front into line,*** 2. ***MARCH.***

The leading section moves straight to the front. Each section in rear obliques to the right until opposite its place in line, when it obliques to the left, moves to the front, and takes its place on the line.

Rule I governs the gaits.

612. To the right (left): 1. ***Right*** (***Left***) ***into line,*** 2. ***MARCH.***

The leading section executes a right wheel, and then moves straight to the front. The other sections move forward and successively wheel to the right when by so doing they will be opposite their positions in line; they then move to the front and take their places on the line.

If, in the execution of the movement, the sections in rear move at a faster gait than the leading section, the second section in the column inclines to the right sufficiently to clear the leading section.

Rule I governs the gaits.

613. On the right (left): 1. ***On right*** (***left***) ***into line,*** 2. ***MARCH.***

Executed as prescribed for ***to the right into line,*** except that the second section in the column inclines to the ***left*** in order to clear the leading section, and that each section passes beyond the preceding one before wheeling to the right; also that the leading section is habitually halted on advancing three carriage lengths after the completion of its wheel.

614. To form line at closed intervals, the captain commands: ***At closed intervals,*** before giving the prescribed commands for forming line; the battery is then formed with eight instead of seventeen yards intervals.

To Form Flank Column from Section Column.

615. 1. ***Flank column,*** 2. ***Right*** (***Left***) ***oblique,*** 3. ***MARCH.***

The rear carriages of all the sections oblique to the right simultaneously, and then oblique to the left, when by so doing they will have an interval of seventeen yards from the leading carriages. The carriages of each rear section close upon the carriages which precede them in the column, at the gait of the carriages which oblique.

Rule I governs the gaits.

To Form Line to the Front from Flank Column.

616. 1. ***Right*** (***Left***) ***front into line,*** 2. ***MARCH.***

The carriages on the right of the column execute ***right front into line,*** as prescribed for a section column. The carriages on the left move by the right flank, and each forms in section column behind the right carriage of its own section.

Rule I governs the gaits.

To Form Section Column from Flank Column.

617. 1. ***Pieces*** (***Caissons***) ***front,*** 2. ***MARCH.***

Executed successively by each section, as prescribed in The Driver; each section in rear times its movement so as to follow in the track of the preceding section at proper distance.

Rule II governs the gaits.

To Form Double Section and to Resume the Previous Order.

618. Being in line or in section column: 1. ***Double section,*** 2. ***Right*** (***Left***) ***oblique,*** 3. ***MARCH.***

Executed simultaneously by all the sections, as explained in The Driver; the rear sections, when in section column, close up at the gait of the carriages which oblique.

Rule I governs the gaits.

619. To resume the previous order: 1. ***Pieces*** (***Caissons***) ***front,*** 2. ***MARCH.***

Executed by each section as explained in The Driver. The movement is simultaneous when executed from double section line; successive, when executed from double section column.

Rule II governs the gaits.

620. Being in flank column: 1. ***Double section,*** 2. ***Right*** (***Left***) ***oblique,*** 3. ***MARCH.***

Executed simultaneously by all the sections as explained in The Driver.

Rule I governs the gaits.

621. To resume the previous order: 1. ***Flank column,*** 2. ***Right*** (***Left***) ***oblique,*** 3. ***MARCH.***

Executed simultaneously by all the sections as explained in The Driver.

Rule I governs the gaits.

622. The line or column of double sections is maneuvered as explained for the normal order in line or in section column, with the exceptions made necessary by the difference of formation. The carriages retain their relative order until they are again formed in the normal order in line, in section column, or in flank column. The posts of individuals are analogous to those prescribed for the order in line or column.

Passage of Obstacles.

623. If, while maneuvering or marching, an obstacle is encountered by any subdivision, its chief, without waiting for orders, gives appropriate commands for avoiding the obstacle and for resuming the original formation as soon as the obstacle is passed.

SECTION X.—*To subdivide the battery for action.*

624. Before unlimbering the guns for action, the battery on a war footing is subdivided into firing battery, reserve, and train (paragraph 545). The battery of maneuver is subdivided into the firing battery and the reserve; in this case the firing battery consists of the first five sections of the battery; the reserve, of the sixth section.

625. To subdivide the battery and prepare it for action, the captain commands: ***FORM AND PREPARE FOR ACTION.***

The carriages of the firing battery are at once prepared for action, as explained in paragraph 220. The reconnaissance and signal officer, if present, and the reserve and the train commanders report to the captain for instructions.

The subdivision is ordinarily effected in rear of the position to be occupied. As the guns are moved forward to their position, the reserve commander posts the reserve under cover in the general locality indicated by the captain; the quartermaster sergeant similarly posts the train.

The ***first caisson*** of the fifth section is habitually unlimbered on the right of the line of guns, the ***second caisson*** on the left. Depending upon the nature of the ground and the circumstance of the case, the fifth section may either follow the remainder of the battery toward the position for action and take post under the direction of its chief in the most convenient manner; or, at the subdivision for action, the caissons may take post on their appropriate flanks of the battery, accompany it to the position, and unlimber simultaneously with the guns. In the absence of special instructions from the captain the chief of the fifth section adopts the measures best suited to the immediate case. One or both caissons may be unlimbered in rear of the line under cover, depending upon the nature of the ground and the character of the action. If practicable, the captain uses the caisson on the windward flank as his observing station.

626. If, for any reason, it is desired to subdivide the battery without preparing for action, the captain commands: ***FORM FOR ACTION.*** In this case the battery is subdivided, as prescribed above, but the carriages of the firing battery are not prepared for action.

627. During the elementary instruction of the battery in fire discipline, the captain may require the chief of the third platoon to drill his platoon in the exercises of the platoon mounted.

SECTION XI.—*To form in battery and to resume a marching formation.*

General Provisions.

628. The double section line and the double section column are the habitual formations preliminary to taking the order in battery. The double section line is adapted to unlimbering for action either to the front or the rear; the double section column, to unlimbering for action to the flank. By suitable maneuvers the battery is placed on the desired ground in the appropriate formation before the commands for unlimbering are given.

629. When unlimbering to fire projectiles, or for the practice of fire discipline, the captain and the chiefs of platoon and section dismount. The captain's horse is held under cover near the position of the battery by one of the musicians. Each chief of platoon passes the reins of his horse to the swing driver of his nearest caisson, when the caissons are on the left; to the lead driver of his nearest piece, when the pieces are on the left; each chief of section passes his reins to the swing driver of his piece; these horses are led off with the limbers, and are returned in like manner on limbering after action.

The first sergeant, musicians, orderlies, etc., habitually dismount when their duties require them to remain with the firing battery. The first sergeant sees that such horses are held under cover.

630. In horse batteries, the cannoneers, except horse holders, lismount at the command ***Action front*** (***rear,*** etc.), link their horses and run to the carriages. The horse holders follow the limbers and post the led horses in rear of the caisson limbers.

631. In active service and in instruction simulating it, the limbers are habitually placed under cover in the vicinity of the guns, and generally on the flank. At ceremonies the limbers are placed in rear of their carriages, as prescribed in paragraphs 223, 224, and 225. If the captain desires the limbers to be posted under cover, he indicates the position they are to take before giving the commands for unlimbering; in the absence of such instruction the limbers are posted. in rear of their carriages.

632. When posted elsewhere than in rear of the guns, the limbers are formed so as to take the best advantage of cover, generally in double section line faced toward the enemy, and with intervals of about ten yards between limbers of adjacent sections. If unlimbered from line, the limbers of each section execute a left about as prescribed in paragraph 223, and move straight to the rear; if from column, they wheel toward the rear of the position. After thus clearing the front of the position, they form in double section column at the command or signal of the first sergeant and are conducted by him to the place designated by the captain, where they are formed right or left into line, as the case may be. If the position is to be occupied for a considerable time, the first sergeant dismounts the drivers, allows them to stand at rest, puts the senior caisson corporal present in charge, and returns to the position of the guns.

633. If the limbers are posted on the flank of the battery, at the command or signal for limbering, they file off from the flank nearest the battery and move in section column toward it; on approaching the position, the piece and caisson limbers separate and form in two columns, each column being directed toward the trails of the corresponding carriages.

As soon as the fifth section caissons are limbered, the chief of this section assembles his section on the proper flank of the battery and in a formation similar to that of the remaining sections of the battery.

634. In unlimbering, the limbers habitually move to their posts at a trot. In limbering, they move at a walk, unless an increased gait is ordered.

635. After unlimbering, the guns and caissons are habitually aligned toward the right.

To Fire to the Front.

636. Being in line of double sections, the caissons on the left of their pieces: ***ACTION FRONT.***

Executed as prescribed in paragraph 223.

To Fire to the Rear.

637. Being in line of double sections, the caissons on the right of their pieces: ***ACTION REAR.***

Executed as prescribed in paragraph 224.

To Fire to the Flank.

638. Being in double section column, the caissons on either flank of their pieces: ***ACTION RIGHT (LEFT).***

Executed as prescribed in paragraph 225.

To Limber to the Front and Rear, and to March.

639. 1. *Limber,* 2. ***FRONT AND REAR.***

Executed as prescribed in paragraph 228.

After limbering to the front and rear, the teams of each section face in opposite directions.

640. *To march in Line:* 1. *Pieces (Caissons) front,* 2. ***MARCH.***

The carriages designated move straight to their front; the others execute an about and quicken the gait so as to follow in section column the carriages of their own sections which precede in the movement.

641. *To march in column to the flank:* 1. *Flank column,* 2. *Pieces by the right (left) flank,* 3. ***MARCH;*** or, 1. *Double section,* 2. *Pieces by the right (left) flank,* 3. ***MARCH.***

All the carriages move by the flank in the indicated direction, the caissons so regulating the gait as to place themselves abreast of their pieces in flank column or double section, as the case may be.

To Limber to the Rear, and to March.

642. 1. *Limber,* 2. ***REAR.***

Executed as prescribed in paragraph 229.

After limbering to the rear, the teams all face in the same direction.

643. To march in line: 1. *Pieces (Caissons) front,* 2. ***MARCH.***

The carriages designated move straight to the front; the others follow their proper carriages in section column.

644. *To march in column to the flank:* 1. *Flank column,* 2. *Pieces by the right (left) flank,* 3. ***MARCH;*** or, 1. *Double section,* 2. *Pieces by the right (left) flank,* 3. ***MARCH.***

All the carriages move by the flank in the indicated direction, the caissons so regulating the gait as to place themselves abreast of their pieces in flank column or in double section, as the case may be.

To Form Double Section Line After Limbering.

645. 1. *Form double section line,* 2. ***MARCH.***

If the battery has been limbered rear, the pieces stand fast stand fast; each piece inclines to the right, executes a left about and places itself in double section on the right of its caisson.

If the battery has been limbered rear, the pieces stand fast and each caisson moves up and places itself in double section on the left of its piece.

CHAPTER V.—THE BATTALION MOUNTED.

SECTION I.—*Organization of the Battalion.*

646. A battalion of field artillery consists of three batteries and of the authorized staff and noncommissioned staff. It is commanded by a major.

The field, staff, noncommissioned staff, etc., of a battalion are as follows:

Personnel.	No.	Duties.
Major	1	Commands battalion.
Captain	1	Adjutant and reconnaissance officer.
Lieutenant	1	Quartermaster and commissary.
Sergeant-major	1	Assistant to adjutant and reconnaissance officer.
Quartermaster sergeant.	1	Assistant to quartermaster and commissary.
Musician	1	Musician, orderly, and horse holder. (Detailed from one of the batteries, additional strength.)
Privates	2	Drivers of the battalion commander's reel and instrument cart. (Detailed from a battery; additional strength.)

SECTION II.—*Formations of the Battalion.*

647. The normal formations of the battalion are: The *order in line*, the *order in section column*, the *order in flank column*, and the *order in battery.*

The individual batteries are formed in each case as heretofore prescribed (pars. 552–558); and, in each case, the formation of the battalion is analogous thereto.

648. In the normal order, the interval between batteries *in line* or *in battery* is twice the interval between the sections of the batteries. The distance between batteries *in section column* or *flank column* is carriage length.

649. If the battalion is formed in column, with its batteries each formed in the order in line, the formation is termed a *column of batteries.* The distance between the batteries is equal to the battery front, when at *full distance;* it is carriage length, when at *closed distance.* When the battalion is in column of batteries at closed distances it said to be *closed in mass.*

650. If the battalion is formed in line with its batteries each formed in the order in section column, or the order in flank column, the formation is termed a *line of section columns* or *a line of flank columns.* Full interval, in this case, is such as would result if the batteries had executed a simultaneous change of direction to the right or left from a formation of the battalion in the order in section column or the order in flank column; closed interval is carriage length or such as the major may prescribe.

651. At formations of the battalion, batteries habitually take their places from right to left in line, from front to rear in column, in the order of rank of their captains.

Batteries whose captains are absent take their places in line or column according to the relative rank of the officers present in command of them. A battery whose captain is absent for a few days only retains its place, according to the rank of the captain, unless otherwise ordered by the major.

After the formation of the battalion no cognizance is taken of the relative order of the batteries. On marches the major ordinarily varies from day to day the relative order of the batteries in column.

SECTION III.—*Posts of Individuals.*

652. At ceremonies the major is thirty yards in front of his battalion, opposite the center. On other occasions he places himself where he can most readily observe and direct his battalion. The commissioned staff is posted two yards in rear of the major, in order of rank from right to left; the noncommissioned staff and the musician, similarly formed, two yards in rear of the commissioned staff.

When the agents of communication and scouts are with the ttalion commander the noncommissioned officers form in line two yards in rear of the noncommissioned staff, in the order of the permanent alphabetical designations of their batteries from right to left. The privates are similarly formed in rear of the noncommissioned officers, except that when the battalion cart is in use they are with the latter. The battalion cart is posted in rear of the battalion staff, or with one of the batteries, as may be prescribed by the battalion commander.

Whenever the maintenance of a close formation would be unduly conspicuous or dangerous, as, for example, in approaching a position for reconnaissance, the staff, agents, etc., of a commanding officer do not retain their prescribed posts; they are required to dispose themselves so as to secure the greatest measure of concealment consistent with a proper performance of their duties. *This rule is general.*

SECTION IV.—*To form the Battalion.*

653. To form the battalion in line, the adjutant causes adjutant's call to be sounded; the adjutant and sergeant-major proceed to the selected ground and post themselves facing each other a few yards outside the points where the right and left of the right battery of the battalion are to rest.

The batteries approach the line from the rear and are posted in succession from right to left by their captains, so that the heads of the lead horses will be on the line established by the adjutant and sergeant-major. After halting his battery, each captain aligns it toward the right, as prescribed in paragraph 656.

When the battery that arrives first on the line has been established, the sergeant-major joins the battalion noncommissioned staff.

The line being formed, the major and his staff take post facing the center of the battalion. The adjutant then moves at a trot or gallop by the shortest line to a point midway between the major and the center of the battalion, halts, facing the major, salutes with the right hand, and reports: ***Sir, the battalion is formed.***

The major returns the salute with the right hand.

The adjutant then takes his post with the battalion staff.

654. The battalion may also be assembled in any other convenient formation. In such cases, as soon as the last battery has taken its place, the adjutant joins the major and reports to him that the battalion is formed.

655. Officers draw and return saber with the major. At ceremonies, sabers are habitually drawn; at other times, they are drawn or kept in the scabbard at the discretion of the major.

656. ***To align the battalion.***—To effect a general alignment the major causes one of the flank batteries to be established in the desired position, and commands: 1. ***By battery;*** 2. ***Right*** (***Left***); 3. ***DRESS.***

Each captain, in turn, commencing with the battery first posted, aligns his battery (par. 596) toward the flank designated, and commands ***Front*** when the alignment is complete.

The captain and first sergeant of the battery first established superintend the alignment from the flank of their battery nearest the point of rest. The captain and first sergeant of the other batteries superintend the alignment from the flank of their battery farthest from the point of rest.

657. ***To dismiss the battalion.***—The major commands: ***Dismiss your batteries,*** or sends appropriate instructions to the captains. Each captain marches his battery to its park and dismisses it.

SECTION V.—*Maneuvers of the Battalion.*

658. To reach the position for action at the proper time and to occupy it skillfully are the objects to be aimed at in training in maneuver.

The actual occupation of the position is not, as a rule, effected by a formal maneuver of the battalion as such, but rather by the separate movement of the individual batteries to the positions assigned them, to the end that all possible advantage may be taken of the cover and concealment afforded by the ground.

Formal maneuvers of the battalion, as such, are consequently of limited application.

For passing from one formation to another, and for the simple evolutions requisite for ceremonies and the ordinary incidents of service, the battalion is maneuvered in accordance with the principles heretofore prescribed for a single battery and by similar commands. In the case of simultaneous movements, such as marching to the front, to the flank, to the rear, obliquely, etc., the command or signal of execution of the major is immediately repeated by the captains and simultaneously executed by the batteries. In the case of successive movements, the captains maneuver their batteries so as to cause them to assume their proper positions by the shortest route and in conformity with the principles of the rules of gaits (par. 594).

659. The commands of the major are transmitted by couriers, or given by arm, saber, or bugle signals, or by word of mouth. The captains habitually repeat the commands of the major, or give such commands as may be necessary to insure the execution of the movement. Their commands are given by arm or saber signal, or by word of mouth. The whistle, and not the bugle, is habitually used to attract attention to the signals of the captain during the evolutions of the battalion.

CHAPTER VI.—THE REGIMENT MOUNTED.

SECTION I.—*Organization of the Regiment.*

660. A regiment of field artillery consists of six batteries, organized into two battalions, and of the authorized staff, noncommissioned staff, and band. It is commanded by a colonel.

The field, staff, noncommissioned staff, etc., of a regiment are as follows:

Personnel.	No.	Duties.
Colonel	1	Commands regiment.
Lieutenant-colonel	1	Assists colonel.
Majors	2	Command battalions.
Captain	1	Adjutant and reconnaissance officer.
Captain	1	Quartermaster.
Captain	1	Commissary.
Veterinarians	2	
Sergeant-major	1	Assistant to adjutant and reconnaissance officer.
Quartermaster sergeant	1	Assistant to quartermaster.
Commissary sergeant	1	Assistant to commissary.
Color sergeants	2	
Musician	1	Musician, orderly, horse holder. (Detailed from one of the batteries; additional strength.)
Privates	9	Mounted orderlies.
	2	Drivers regimental commander's reel and instrument cart. (Detailed from a battery; additional strength.)
Chief musician	1	Band.
Chief trumpeter	1	
Principal musician	1	
Drum major	1	
Sergeants	4	
Corporals	8	
Cook	1	
Privates	11	

SECTION II.—*Formations of the Regiment.*

661. The formations of the regiment are similar to those of the battalion, the intervals and distances between battalions being normally twice those between batteries.

662. If the regiment is formed in line with its battalions each in column of batteries closed in mass, the formation is termed a *line of masses.* The normal interval between battalions in this case is two carriage lengths.

663. At formations of the regiment, battalions normally take their places from right to left in line, from front to rear in column, in the order of rank of the battalion commanders.

But if battalions of artillery of different types are grouped in a regiment, they are, at ceremonies, formed in order from right to left in line, or from front to rear in column, as follows: Horse artillery, light artillery, heavy artillery, mountain artillery.

Battalions of the same type, whose permanent commanders are absent, take their places in line or column according to the relative rank of the officers present in command of them. A battalion whose permanent commander is absent for a few days only retains its usual place, unless otherwise ordered by the regimental commander.

After the formation of the regiment no cognizance is taken of the relative order of the battalions.

SECTION III.—*Posts of Individuals.*

664. At ceremonies the colonel is sixty yards in front of his regiment, opposite the center. On other occasions he is where he can best observe and direct his regiment.

The lieutenant-colonel is on the right of the commissioned staff; the commissioned staff is two yards in rear of the colonel, adjutant on the right, the others in order of rank from right to left; the noncommissioned staff and musician are two yards in rear of the commissioned staff and in similar formation.

When the agents of communication and scouts are with the regimental commander, the noncommissioned officers form in line two yards in rear of the noncommissioned staff, in the order of the permanent numerical designation of their battalions from right to left. The privates are similarly formed in rear of the noncommissioned officers.

SECTION IV.—*To form the Regiment.*

665. The battalion commanders are notified as to the time, place, and order of formation of the regiment. Each forms his battalion at the time and place designated, and in the order prescribed.

For line formations the adjutant indicates to the major of the first battalion the point of rest and the line on which the regiment is to be established; he then takes post about thirty yards in front of the center of the regiment.

The line being formed, the colonel, the lieutenant-colonel, staff, etc., take post facing the center of the regiment.

The adjutant then brings the regiment to attention, if not already at attention, faces the colonel, salutes, and reports: ***Sir, the regiment is formed;*** the colonel returns the salute with the right hand. The adjutant then takes post with the regimental staff.

The regiment may also be formed in any other convenient formation; in such cases, as soon as the last battalion has taken its place the adjutant joins the colonel and reports to him that the regiment is formed.

SECTION V.—*Maneuvers of the Regiment.*

666. The colonel causes his commands to be transmitted to the battalion commanders, and the latter maneuver their battalions according to the principles heretofore prescribed, so as to place them in the desired formation at the proper time and place.

The commands of the colonel may be given by bugle, arm signals, or voice, but as a rule they are conveyed by couriers.

PART V.

THE SERVICE OF INFORMATION AND COMMUNICATION.

CHAPTER I.—PERSONNEL.

667. The enlisted personnel regularly assigned to the service of information and communication in a regiment of field artillery is as follows:

Battalion.	Battery.	Agents of communication.		Signal detail.	Scouts.
		Between battery and battalion commanders.	Between battalion and regimental commanders.		
1st	1st	1 corporal		1 corporal, 4 privates.	1 corporal, 1 private, or 2 privates.
	2d	1 corporal		1 corporal, 4 privates.	1 corporal, 1 private, or 2 privates.
	3d	1 corporal	1 sergeant	1 corporal, 4 privates.	1 corporal, 1 private, or 2 privates.
2d	1st	1 corporal		1 corporal, 4 privates.	1 corporal, 1 private, or 2 privates.
	2d	1 corporal		1 corporal, 4 privates.	1 corporal, 1 private, or 2 privates.
	3d	1 corporal	1 sergeant	1 corporal, 4 privates.	1 corporal, 1 private, or 2 privates.

668. Scouts are especially charged with securing information. Agents of communication[a] are especially charged with keeping a commander and his immediate subordinates in touch with each other, whether by carrying messages or by the use of telephones or signals.

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[a] Usually refered to as "agents." They are provided with red brassards, which are worn on the left arm.

The signal detail is especially charged with establishing and operating the necessary system of telephone or signal communication.

The special instruction of the signal detail is generally confined to setting up and operating telephone lines and to signaling with the flag, heliograph, and lantern.

In the exigencies of service scouts and agents are apt to be called upon to perform each other's duties indiscriminately. Scouts are accordingly instructed in the special duties pertaining to agents, and *vice versa*, while both are instructed in telephone and signal duties.

669. The men designated for the foregoing duties are selected for special aptitude, and are carefully instructed in the functions which they are to perform. Additional men are designated to receive the instruction at the same time, so that substitutes may be available.

The instruction is ordinarily by battalion and under charge of the battalion adjutant.

670. Scouts and agents are mounted. Two men of the signal detail of each battery are also mounted in order that they may act as line guards.

671. Scouts and agents join the officer to whom assigned, and enter upon their duties at the formation of the command or at the time designated by the officer.

CHAPTER II.—SCOUTS.

SECTION I.—*Duties of Scouts.*

672. To secure information which will facilitate the movement and the employment of artillery is the special function of artillery scouts.

The movement of artillery is facilitated, for example, by determining the practicability of a given route; by exploring a section of country and selecting the best routes for traversing it; by locating any bodies of the enemy which might obstruct the movement, etc.

The employment of artillery is facilitated, for example, by determining (*a*) the dispositions of the enemy, (*b*) the dispositions of our own troops, (*c*) such changes in these dispositions as may occur from time to time during the progress of an action; by observing the effect of our fire, and indicating, if necessary, corrections which will insure its proper adjustment; by reporting the arrival of hostile parties within dangerous proximity of the artillery position, etc.

The special functions of scouts are, then, to reconnoiter, to observe, to report.

673. The scouts pertaining to the batteries of a battalion are, as a rule, instructed by the battalion adjutant. In service they act as battalion scouts, under the immediate direction of the adjutant (reconnaissance officer).

When a battery is detached from its battalion, however, its scouts accompany it.

When the artillery force operating together comprises more than one battalion, the artillery commander employs, under his own direction, such of the battalion scouts as he may need, or else distributes the reconnaissance duties among the different battalions.

674. On minor duties scouts may operate singly. Ordinarily, however, they operate in pairs, one devoting his special attention to gaining the desired information, the other looking out for safety, keeping track of the route followed, and watching for signals from the main position or from neighboring scouts. In especially important cases a patrol consisting of several scouts under a reconnaissance officer is employed.

Scouts operate according to the rules laid down for patrols (see Field Service Regulations, par. 72 *et seq.*), so far as these rules are applicable to their more restricted functions. When sent on a duty they are to be given explicit instructions as to the information required, as to the place for reporting, and as to the time available for securing the desired information. Full latitude is to be allowed them in the choice of ways and means to carry out the duties imposed.

675. The nature of the duties to be performed by scouts is indicated below:

1. In reconnoitering a designated road the scout prepares himself to report especially upon: its general practicability for artillery; pioneer work needed, if any; condition of the road as affecting rate of march; strength of bridges; the existence of defiles on the road, such as causeways, bridges, narrow valleys, etc.; practicability in general of leaving the road and moving across adjacent country; existence of intersecting roads, with direction and destination.

2. In selecting a route to a given point the scout endeavors first to get a good view of the terrain. If no road exists in the desired direction, he studies the lay of the ground and judges where the most practicable route will be. If possible, he selects certain landmarks on the proposed route, from which good views can apparently be obtained, and proceeds rapidly from one to the other, studying the country as he moves. Having determined a practicable line of advance to the given point, he may make more detailed investigations as he returns.

When the advance to an artillery position is in question, it is especially desirable that scouts should examine all the ground in the neighborhood of the position, so as to be able to lead officers or batteries quickly to any part of it.

3. In reconnoitering a route, scouts must be especially careful to note landmarks, to turn frequently and look at the country which they have passed, and to take such other measures as will enable them to surely retrace their steps either by day or night. Practice in moving at night is particularly important for scouts.

4. When sent to examine a place in which an enemy may be concealed—for example, a wood, a defile, a village—scouts first examine its approaches, its edges, and, if possible, its exits; they endeavor to reach a position from which they can overlook it; ordinarily, one scout or one party should observe, while another passes through the suspected place.

If preceding the column by only a short distance, scouts must act in such cases with great promptness.

5. When the information at hand as to the location and disposition of the enemy is insufficient, scouts may be pushed forward to secure this information, both by personal reconnaissance and by communicating with our own advanced troops. In such cases they should fix in their minds the lay of the ground near the enemy's positions, noting such landmarks and making such sketches as will enable them to give a clear description of his situation. Similar information should at the same time be secured with regard to our own troops.

6. During an action, when observation of fire or of the terrain is difficult, parties of scouts may be sent to occupy positions from which they can keep their commander continually informed as to the efficacy of the fire and as to changing conditions in the field of action. Thus they should be able to verify the presence of the enemy in a certain locality and report his situation and dispositions with reference to certain landmarks;

to report the arrival of bodies of the enemy in a given position or their departure therefrom; to report the positions occupied by our own troops, the possibility of firing over them with safety, and special ways in which the guns may be of assistance to them; to report whether or not our fire is properly adjusted, indicating such corrections as may be necessary.

When on this duty scouts should, whenever practicable, gain touch with our own advanced troops and act as a medium of communication between their own artillery commanders and such troops.

7. Artillery in position is, as a principle, safeguarded by troops of the other arms; but when posted in exposed positions, as, for example, on the flank of a line, it is incumbent upon the artillery commander, as an additional precaution, to post scouts where they may, by suitable signals, give timely warning of the approach of hostile parties.

8. The information secured by a single scout is ordinarily communicated by a verbal report. In the case of a patrol, however, it is often advisable for the patrol commander to send concise written reports, giving important information as it is secured. These reports should be supplemented by a sketch on which is indicated the important information secured. A route sketch should be on a scale of three inches to the mile. A panorama sketch of the enemy's position should show angular distances in mils between important points. The point from which the sketch was made should be clearly stated and should, if practicable, be indicated on the route sketch.

Scouts acting as auxiliary observers during an action report, if possible, by telephone; otherwise, by signals with flag, heliograph, or lantern.

In communicating with each other for the purpose of indicating a change in the direction of march scouts employ the signals prescribed in Artillery Drill Regulations. The whistle or the arm signal is used for attracting attention.

To indicate danger, enemy in sight, both arms are raised vertically. The arms are raised and lowered energetically several times if the danger is imminent.

SECTION II.—*Training of Scouts.*

676. For scout duty, alert, cool-headed and intelligent men should be selected; they should be good horsemen and have good eyesight and good hearing.

Each scout should be provided with a good field glass or telescope, a compass, a watch, a whistle, a pocket message and sketch book, and a pencil.

677. The training of a scout should have for its object:

1. To develop his powers of observation.
2. To teach him what to look for and how to recognize it.
3. To teach him how to report intelligently and concisely.

The scout's powers of observation and description are developed first of all by simple exercises. Thus he may be required to look at a given section of terrain and describe what he sees in it.

The scout is made to appreciate the lay of the land as indicated primarily by its water system, and secondarily by other natural features, and by the works of man. A good *eye for country* is thus to be acquired; the scout learns to appreciate the configuration of a terrain which may be only partially visible to him, and thus deduce the most favorable routes for traversing it, and the most probable positions for hostile occupation.

The scout must also be taught to distinguish troops of the different arms, to recognize their formations, and to familiarize himself with their usual methods of action. He must acquire the ability to appreciate a tactical situation and to give a clear report of it.

The scout must be trained (*a*) to use field glasses or telescopes; (*b*) to read maps; (*c*) to make reports both verbal and written; (*d*) to make route sketches; (*e*) to make panorama sketches of positions.

CHAPTER III.—AGENTS OF COMMUNICATION.

678. An agent of communication is an officer or enlisted man charged with the duty of keeping a commander and a subdivision of his command in touch with each other. He transmits orders to the subdivision and keeps the commander informed of all matters of importance affecting his subdivision.

679. The duty devolves upon each subdivision to provide the agent of communication for linking it with the next higher chief. The following are the agents regularly called for and permanently detailed in an artillery command:

Between each battery commander and the battalion commander: One corporal.

Between each battalion commander and the regimental commander: One sergeant.

Between each regimental commander and the next higher commander: One officer.

When the artillery operating with a given force consists of a single battery, a single battalion, or a single regiment, then the agent who would have reported to the next higher artillery commander, reports instead to the commander of the troops.

When the larger masses of artillery are involved, if the senior artillery officer is not with the officer commanding the troops, he sends an officer to link him with the latter.

When a command is so situated as to require other agents than those specified above they are detailed by the subdivision commanders concerned. Thus, when the battery reserves and trains are united to form battalion regimental reserves and trains, the reserve and train commanders each detail an agent to link them with the battalion or regimental commander, as the case may be.

680. The special duties of an agent are:

1. To act as courier.
2. To mark the route.

SECTION I.—*Couriers.*

681. A courier: (*a*) Makes every effort to keep himself informed as to the location of the subdivision to which he pertains, and as to the route by which it may be most readily reached.

(*b*) When sent on a mission he notes carefully the country traversed, the facilities and difficulties which it affords for the passage of troops, and endeavors to impress upon his mind the features of the terrain so that he would be able to guide troops through it if called upon to do so.

In pursuing a given route for the first time, it is advisable to turn frequently and observe how objects appear after they have been passed; retracing the same route is thus much facilitated.

(*c*) He moves promptly when on an errand, and allows nothing to delay or interrupt him. All military persons are required to expedite the movements of such messengers, to provide a fresh mount, if necessary, and point out promptly the best routes for reaching the subdivision or individual sought.

(*d*) On reaching his destination, if the individual sought is not immediately seen or recognized, he calls out his name or military designation: e. g., "Commanding officer, Battery A, First Field Artillery."

(*e*) Having delivered the message he waits in the presence of the individual receiving it until notified whether or not an answer is to be taken. In case of delay he asks for instructions.

Important messages should always be in writing, and should be acknowledged by the receiver's initials on the envelope with date and time.

Verbal messages should always be repeated by the courier in the presence of the sender before starting on the errand. The message should be couched in concise terms. *The sender should make sure that the courier grasps its spirit and meaning.*

If a courier is aware of the nature of the message carried, and has noted any circumstances bearing upon its subject-matter since leaving the sender, he should, after delivering the message, report the circumstances.

(*f*) If a courier, after diligent search, is unable to find the individual to whom he is sent, he should return promptly and report the fact to the sender.

It is the duty of all subordinate commanders, however, to notify the next higher commander, when circumstances require them to make, without the knowledge of the latter, a material change of position.

(*g*) A courier should note matters of military interest, especially those affecting the subdivision to which he pertains, and should make report of any essential matters on his return to the officer to whom he is assigned.

If he carries an order directing a change of position of a subdivision, it is often advisible to direct him to accompany the subdivision into the new position so as to enable him to become famliar with the ground and to be able to report upon conditions in the new position.

SECTION II.—*Marking the route.*

682. When an officer precedes his command for reconnaissance or other purposes, or when the parts of a command following the same route are considerably separated, it is incumbent upon the officer or party in front to *mark the route*, so that uncertainty may not arise as to the direction to be followed.

A commander ordinarily employs his agents on this duty; scouts or the members of his staff or noncommissioned staff may likewise be employed. The adjutant, or, in his absence, the sergeant-major, of a battalion or regiment is charged with supervising this duty, and relieving the commanding officer of the necessity of attending to it.

The parts of a column are linked to each other by mounted noncommissioned officers or men left by the leading elements, in turn, at places where uncertainty may arise.

683. A marker is made to understand clearly:

(*a*) The route to be followed.
(*b*) The particular organization to be guided.
(*c*) The message, if any, to be delivered.
(*d*) The route he is to follow in order to rejoin the commanding officer.

The marker indicates the correct route, acting as guide if necessary over terrain where the route is difficult to follow, and as soon as his mission is fulfilled hastens to rejoin his commanding officer. If necessary, mounted men may be temporarily taken from the organizations of the command to increase the number of markers. The number employed, however, should always be the minimum consistent with insuring the uninterrupted march of the command.

By the establishment of well-understood conventions, or by the use of suitable signs, the number of markers may be reduced. Thus, it should be understood that a main highway is not, without indication, to be left for a minor road, and that a straight road is not, without indication, to be left for one which deviates from it. By marking arrows on trees and buildings, or by other suitable signs, uncertainties of a minor nature may be removed. In important cases, however, a marker should always be left at places where a reasonable doubt may arise.

CHAPTER IV.—TELEPHONE AND SIGNAL COMMUNICATION.

684. Each battery, battalion, and regimental commander is provided with suitable telephonic and signalling apparatus.

When telephonic communication is to be employed, the exact method of utilizing the material provided—the number of stations to be established, the kind of wire to be used—is determined by the circumstances of the case. If distances are short, hand reels are used; if long, the battalion reel carts are employed. In selecting observing stations, ease and facility in establishing and maintaining communication should be kept in mind; battalion commanders may often post themselves near one of their batteries, regimental commanders near one of their battalions.

685. The following individuals should regularly receive this instruction:

In each battalion: (1) The battalion sergeant-major; (2) the battalion agents of communication (one corporal from each battery); (3) the battery signal details—a corporal and four men from each battery (the corporal is designated as "telephone corporal;" he, as well as the four privates, should be selected for special aptitude, and should then be assigned to the fifth section of their battery; the privates are designated, respectively, No. 1, No. 2, No. 3, No. 4); (4) the scouts (two from each battery).

In each regiment: (1) The regimental sergeant-major; (2) the regimental agents of communication (a sergeant from each battalion); (3) the battalion details above mentioned.

686. *Battery communication.*—The "telephone corporal" is charged with the establishment and maintenance of battery communication and with the care of the materail.

Whenever a battery commander is far enough away from his battery to require telephone or signal communication to be established between him and the battery, the corporal and No. 1 are the operators; the corporal at the battery, No. 1 at the battery commander's station.

Whenever telephone or signal communication is established between the battery commander and the battalion commander, No. 2 is the operator at the battery commander's station.

When telephone or signal communication between the battery commander and his battery is not needed, and an auxiliary observing station for the battery is needed, the corporal and No. 1 may be employed for the establishment of communication with such station.

Nos. 3 and 4 are *line guards*, and are habitually mounted.

687. *Battalion communication.*—The battalion sergeant-major is charged with the establishment and maintenance of communication between the battalion and battery commanders and with the care of the material. During the reconnaissance of the position he receives the battalion commander's instructions as to the nature of the communications required.

If telephones are to be used he examines the ground and determines the best route for the line of wire to follow. On the arrival of the guns in position, or before their arrival, if desirable, he causes the wire to be laid, using the reel cart or the hand reels, as circumstances may require. The operator at each battery commander's station makes the connections necessary for establishing his telephone on the line. The sergeant-major acts as operator at the battalion commander's station.

If a station has also to be established for communication with the regimental commander, one of the agents is designated as operator.

If the battalion commander desires to employ telephonic communication with an auxiliary observing station, one of the scouts is designated as operator at the observing station, while one of the agents is designated as operator at the battalion commander's station.

688. *Regimental communication.*—The regimental sergeant-major is ordinarily charged with the establishment and maintenance of communication between the regimental and battalion commanders and with the care of the material. During the reconnaissance of the position he receives the regimental commander's instructions as to the nature of the communications required and takes the necessary steps for establishing the same.

If telephonic communication is called for, both in the regiment and in the individual battalions, hand reels may be employed to lay the line in each battalion from battery to battery and thence to the battalion commander's station; and the reel carts similarly to stretch the line from battalion to battalion and thence to the regimental commander's station. Or such other dispositions may be made as will best adapt the material provided to the needs of the particular case.

The sergeant-major acts as operator at the regimental commander's station.

689. *Guarding the line.*—Whenever wire is stretched for telephonic communication, line guards must be *immediately* posted. Their duties are to warn all parties approaching the wire of its existence and location, to prevent injury to the line, if possible, and to repair such injury as may occur; for the latter purpose they are provided with the necessary repair kits.

Nos. 3 and 4 of each battery signal detail constitute the line guards.

The telephone corporal in battery communication, the battalion sergeant-major in battalion, and the regimental sergeant-major in regimental communication attend to the assignment of these guards to the various lines of wire which may be stretched.

PART VI.

ARTILLERY IN THE FIELD.

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CHAPTER III.—RECONNAISSANCE AND SELECTION OF POSITIONS.

SECTION I.—*Choice of position.*

690. To post the guns so as to be able to carry out effectively the task assigned is always the first consideration in the selection of a position.

Other important considerations are:

1. Securing a large field of fire.
2. Concealment from view.
3. Facility of movement to the front, flanks, and rear.
4. Proximity of good cover for limbers, teams, etc.
5. Favorable conditions for resupply of ammunition.

691. By a suitable choice of positions and of observing stations a great part of the terrain within range of the guns may be included within the field of fire. The nature of the case will decide whether direct or indirect laying, or a combination of the two, is to be employed.

692. The existence of dead spaces may be obviated and the field of fire enlarged by the skillful disposition of the units of an artillery command. More or less dispersion of the units is thus in general called for.

By an intelligent dispersion of units, moreover, the effect of the enemy's fire is diminished and his difficulties in adjustment increased; on the other hand, concentration of effort on our own part may be secured by good organization of the services of information and communication.

693. When not incompatible with the effective accomplishment of the duty to be performed, concealment from view is always to be sought. This is true whether direct or indirect laying is employed. By rendering the guns inconspicuous, or entirely concealing them, their sustained service may be counted upon, while the difficulties of the enemy in locating his targets and adjusting his fire are increased.

694. Skill in the concealment of guns is to be acquired by careful study of ground and by extensive experience on a varied terrain. The following suggestions are to be noted:

Positions which, from the enemy's point of view, are on the sky line are usually the most conspicuous. By placing the guns below the sky line, so that they will have a favorable background, and by preventing movements of the personnel, a battery may be unrecognized even though it is in the open. It is important, however, to have a crest, a hedge, or a clump of trees in front, so as to increase the enemy's difficulties of observation and of exact location. In the absence of natural cover, artificial means may be used to conceal the guns.

A position in rear of a crest, with a parallel crest of about the same height in front and some distance away, offers many advantages. The enemy is apt to mistake the crest nearest him for the one actually occupied and to consider shots falling between the crests as beyond his target. Trees, a hedge, standing grain, etc., four or five hundred yards in front of the guns, and so that the line of sight just passes over them, may similarly serve to deceive the enemy as to our actual position.

When indirect laying is to be employed, a position just far enough behind a gently sloping crest to insure the concealment of the flash best facilitates running the guns up to the crest, should direct laying be called for. If the position is discovered by the enemy, however, and the crest is plainly seen by him, the guns are in a very vulnerable position, as shrapnel may be employed to search such a reverse slope very effectively.

The most advantageous position, from the point of view of concealment alone, is one at least four hundred yards in rear of a covering mass, and hidden from the view of any auxiliary observers of the enemy pushed to the front or flanks.

A defilade of at least twelve feet is necessary for the concealment of the flash.

Keeping the ground in front of the muzzles soaked with water prevents the raising of dust by the blast of discharge.

695. ***Firing over friendly troops.***—Firing over the heads of our own troops is to be regarded as a normal procedure.

Freedom is thus gained to post artillery so as to cover effectively the whole front of combat, to realize the power of concentrating the fire of widely separated units, and to avoid dangerous massing of guns.

696. ***Ruses.***—Dummy emplacements suitably prepared will often serve to deceive the enemy, distract his attention, and cause him to waste ammunition.

A few guns may be sent to occupy advanced positions with a view of drawing the enemy's fire and leading him to disclose his positions and strength. Such guns should be posted with wide intervals; their rapidity of fire may be utilized to produce the impression of constituting a large force of artillery.

SECTION II.—*Reconnaissance.*

697. The duty of locating the enemy and of securing information concerning him devolves in general upon troops of the other arms. It is most essential that the information thus secured should be promptly transmitted to the artillery. As successful cooperative action depends in great measure upon the maintenance of quick and reliable intercommunication between the different elements of a command, artillery commanders should use every means in their power to establish such relations with commanders of the other arms as will insure prompt transmission of information.

698. The artillery must, however, obtain for itself such special information as is needed to insure the proper posting and the effective employment of the guns to carry out the tasks assigned it. For this purpose reconnaissances are made by the artillery commander and his immediate subordinates, assisted by their respective reconnaissance officers and scouts.

The effectice action of artillery is enhanced by (*a*) selecting at once the most favorable positions; (*b*) making the necessary preliminary dispositions, such as securing firing data, organizing a suitable information and communication service; (*c*) preparing cover; (*d*) posting the guns without the knowledge of the enemy; and (*e*) opening at the proper time a sudden, unexpected, and overpowering fire upon the designated objectives.

When it is necessary to bring guns into action quickly for the support of other troops, the main consideration is to get them as promptly as possible to a place from which they can render effective support. In such a case, delay occasioned by the search for technical and tactical advantages is entirely inadmissible. A good eye for ground and skill in making use of available cover may, however, even here permit an artillery commander to post his guns advantageously.

As a rule, though, the necessity for the employment of artillery may be foreseen, and opportunity may be gained for timely preparation.

699. It is essential that the officer commanding the artillery should be in close touch with the officer commanding the troops; he should accompany him on the preliminary reconnaissance; should be kept constantly informed as to the tactical situation and the plan of action, and should receive early instructions as to the special tasks to be performed by the artillery. Similarly, subordinate artillery commanders should be kept informed of the general plan of action and of the situation so far as it affects them.

At the earliest opportunity the officer commanding the artillery reconnoiters the ground which is to be the scene of action and selects the positions for the artillery in accordance with the instructions which he has received and the tactical requirements of the situation. He causes his immediate subordinate commanders to accompany him, or informs them when and where they are to report to receive their instructions and undertake their own reconnaissances. It is important that they should reach the ground at the earliest practicable moment.

700. In undertaking a reconnaissance an artillery commander should have a clear idea in his mind of the general plan of action and of the task to be accomplished by the force under his command. Unembarrassed by details, he should study the tactical situation and the lay of the ground, select the position with a view to carrying out his special mission, and arrange for the necessary preparatory dispositions. The details of securing information, etc., should be performed by reconnaissance officers and scouts.

701. It is often advisable to attach artillery reconnaissance officers to advanced troops in order that they may secure early information as to the enemy, and give the artillery commanders detailed information as to the ground available for occupation by the artillery and as to the location and disposition of the enemy and of friendly troops. To insure effective cooperative action, such officers may similarly be attached to the infantry firing line during an action, in order to keep the artillery commander informed as to changes in the tactical situation and as to the cooperation desired of the artillery by the infantry.

Reconnaissance officers of the smaller artillery units may be attached to the senior artillery commander, when action is imminent, in order that they may commence, before the arrival of their own immediate commander, the detailed reconnaissance of the position selected for the particular unit concerned. A reconnaissance officer operating in this manner, as well as one who arrives with his immediate commander, examines the neighborhood of the position, locates the enemy, prepares firing data, and, in general, secures the necessary information for his commanding officer and relieves the latter of details.

702. Scouts may, when necessity requires, be employed to perform the duties prescribed for reconnaissance officers, or they may be used to assist the latter and supplement the information secured by them.

703. Reconnaissance duties pertaining to various individuals in a force comprising several battalions of artillery are indicated below; the summary thus given, however, is to be regarded merely as a general guide, and not as specifying all the duties to be performed:

Officer commanding the artillery—

(*a*) Informs himself as to the enemy's location and dispositions.

(*b*) Examines the terrain indicated as the general position for the artillery.

(*c*) Assigns the battalions to duties and to positions in accoradnce with the proposed plan of action.

(*d*) Takes general measures to insure intercommunication between the artillery and the other arms, as well as between the elements of the artillery itself.

(*e*) Takes general measures to insure the support of the artillery and its resupply.

Battalion commander—

(*a*) Secures by personal observation and by the employment of his reconnaissance officer and scouts information as detailed as possible as to: The location and disposition of the enemy; the location and disposition of friendly troops; the terrain in the neighborhood of the position—the best methods of approaching it advantageously, its freedom from the enemy, etc.

(*b*) Examines the general position assigned him, and selects the most suitable positions for the batteries.

(*c*) Assigns the batteries to duties and to positions.

(*d*) Determines whether or not artificial cover is necessary giving the necessary instructions therefor in case of need.

(*e*) Provides for such auxiliary observing stations as may be needed to secure information as to the effectiveness of our own fire and as to the movements of the enemy and of friendly troops.

(*f*) Provides for communication with battery commanders and with observing stations.

(*g*) Makes sure that the security of the position is provided for by adjacent troops or by scouts.

(*h*) Selects practicable routes for subsequent possible movements to the front, flanks, or rear.

(*i*) Provides for the resupply of ammunition, selecting a position for the reserve in case the battery reserves are united.

Battery commander—

(*a*) Examines the target assigned him and studies carefully the ground in its neighborhood.

(*b*) Examines the ground assigned him for a position and picks out the most suitable place within the limits imposed for posting the guns.

If direct laying is to be employed, he makes sure that each gunner will be able to see through the sights the part of the target to be assigned to him.

If indirect laying is to be employed, he makes sure that each gun will be able to fire over any intervening obstacle, and selects an aiming point, verifying the fact that each gunner will be able to see it through the sight.

(*c*) Selects a suitable observing station.

(*d*) Arranges for such battery communications as may be necessary.

(*e*) Determines the best method of approaching the position, under cover, if possible.

(*f*) Selects the place for posting his limbers.

(*g*) Selects position for his reserve (whenever the battery reserves are posted separately), doing so with an eye to facilitating the supply of ammunition under cover.

(*h*) Secures such firing data as may be needed.

(*i*) Joins his battery and posts it in the position.

The reconnaissance officer—

A reconnaissance officer is, in general, charged with:

(*a*) Securing by personal reconnaissance (assisted by scouts) such information as to the enemy, our own troops, or the terrain as the officer to whom he is attached may desire.

(*b*) Supervising the work of scouts, observing parties, etc.

(*c*) Securing such firing data, preparing such sketches and tabulating such data as may be requisite to assist in the direction and conduct of fire.

(*d*) Overlooking the field of action, watching for movements of the enemy and of our own troops which may affect the situation, and keeping his commanding officer apprised of changes in the situation.

704. An artillery reconnaissance officer attached to advanced troops should, as soon as possible after the determination of the enemy's location, submit to the artillery commander a report giving such information as is obtainable as to the enemy, and describing the most suitable position for our own artillery. This report should be accompanied by a position sketch in plan, showing the enemy's position, the position selected for our own artillery, the characteristics of the country intervening between the two, the routes by which the selected position may be best approached, and such other important information as may be readily set forth. The report should embrace information such as the following, relative to the position selected: (*a*) Ease or difficulties of the route of approach, stating difficulties, if any; (*b*) possibility of approach under cover; (*c*) whether direct or indirect laying is recommended; (*d*) cover afforded for guns; (*e*) need of providing artificial cover; (*f*) number of guns which may be posted advantageously in the position; (*g*) facilities for protecting the limbers, horses, etc.; (*h*) facility for resupply of ammunition; (*i*) in case indirect laying is recommended, possibility of securing good aiming points and good observing stations, and of firing over intervening obstacles.

As to the enemy, the report should include information as to: (*a*) his apparent numerical strength; (*b*) what is known as to the position of his artillery; in the absence of definite information, the probable position of his batteries should be indicated.

705. Whether in a position thus tentatively selected or in one chosen by an artillery commander, a reconnaissance officer is required in appropriate cases to prepare a panorama sketch of the enemy's position. The known positions of the enemy, and prominent features of the landscape as well, are named or numbered on the sketch; copies of such a sketch being sent to the subordinate artillery commanders, the indication of objectives may be facilitated. Firing data is also secured by the reconnaissance officer and that pertaining to each important position shown in the sketch is indicated above it in the margin. When individuals, using such a sketch for identification of positions, are widely separated, allowance must be made for difference in point of view; moreover, in such cases, the firing data should either be omitted from the sketch or should be transformed for use in each position concerned. The position from which the sketch was made should always be plainly described on the sketch.

PART VII.

CEREMONIES.

CHAPTER I.—GENERAL RULES.

706. On all occasions of ceremony troops are arranged from right to left in line and from head to rear in column in the following order: First, infantry; second, field artillery; third, cavalry. Artillery serving as infantry is posted as infantry; dismounted cavalry and marines are on the left of the infantry in the order named; engineer troops and detachments of the signal corps are on the right of the command to which they are attached; detachments of the hospital corps are signed to place according to the nature of the service. When cavalry and field artillery or field artillery and infantry are reviewed together without other troops, the artillery is posted on the left. In the same arm, regulars, volunteers, and militia are posted in line from right to left or in column from head to rear in the order named. In reviews of large bodies of troops the different arms and classes are posted at the discretion of the commanding general, due regard being paid to their position in camp. On all other occasions troops of all classes are posted at the discretion of the general or senior commander.

707. At formations for ceremony sabers are drawn. At ceremonies mounted the pieces are in front unless the formation is in double section; cannoneers mounted on the chests fold their arms. Mounted officers in facing toward the line and in resuming their front always execute a left about.

Staff and noncommissioned staff officers, when it is not otherwise prescribed, draw and return saber with their chief.

CHAPTER II.—REVIEWS.

SECTION I.—*General Rules.*

708. The adjutant or the adjutant-general posts men or otherwise marks the points where the column changes direction, in such manner that the right flank in passing the reviewing officer shall be about ten yards from him.

709. The post of the reviewing officer, usually opposite the center of the line, is marked by a flag.

710. The reviewing officer, his staff, and others at the reviewing stand, salute the standard as it passes whether the standard salutes or not; those with arms not drawn salute by uncovering. The reviewing officer returns the salute of the commanding officer of the troops, and of such commanding officer only.

711. The staff of the reviewing officer is in single rank, six yards in rear of him, in the following order from right to left: Chief of staff, officers of the general staff corps, adjutant-general, aids, then the other members of the staff in the order of rank, the senior on the right; the flag and orderlies place themselves three yards in rear of the staff, the flag on the right.

712. Officers of the same or higher grade and distinguished personages invited to accompany the reviewing officer place themselves on his left; their staffs and orderlies place themselves respectively on the left of the staff and orderlies of the reviewing officer; all others who accompany the reviewing officer place themselves on the left of his staff, their orderlies in rear. A staff officer is designated to escort distinguished personages and to indicate to them their proper positions.

713. When riding around the troops, the reviewing officer may direct that his staff, flag, and orderlies remain at the post of the reviewing officer or that only his personal staff and flag shall accompany him; in either of these cases the commanding officer alone accompanies the reviewing officer. If the reviewing officer is accompanied by his staff, the staff officers of the commander place themselves on the right of the staff of the reviewing officer.

While passing in review or riding around troops a staff is formed in one or more ranks, according to its size.

714. The staff, flag, and orderlies of brigade commanders place themselves in the order prescribed for the staff, flag, and orderlies of the reviewing officer.

715. When the reviewing officer is not in front or in rear of a regiment, its commander may cause it to stand ***at ease,*** to ***rest,*** or ***to dismount*** and ***rest,*** and to resume ***attention*** and ***mount,*** but so as not to interfere with the ceremony.

716. When the commanding officer of the troops turns out of the column, his post is on the right of the reviewing officer; his staff, in single rank, on the right of the staff already there; his flag and orderlies in rear of his staff.

When the column has passed, the commanding officer, without changing position, salutes the reviewing officer and then with his staff and orderlies rejoins his command.

If the person reviewing the command is not mounted, the commanding officer and his staff, on turning out of the column after passing the reviewing officer, dismount preparatory to taking post on the right of the reviewing officer and his staff. In such case the salute of a commanding officer, prior to rejoining his command, is made with the hand before remounting.

717. Battalion commanders repeat the commands of their regimental commander.

Whenever the colonel faces the line to give commands, the majors face at the same time; they resume their front after seeing the movement executed. All such commands are executed when they have been repeated by the majors. When the command repeated is ***Present saber,*** the lieutenant-colonel and the colonel's staff salute at the command of the colonel; the major's staff salutes at the command of the major; the colonel and majors salute after resuming their front; each staff returns to the carry at the command of its chief. The same rules apply to the colonels and majors and to the general's, colonel's, and major's staffs whenever the brigade commander faces the line to give commands.

When passing in review, the staff of each commander salutes and returns to the carry with him.

718. When the general, the colonel, or the major faces the line to give commands, the staff and orderlies do not change position.

719. Each guidon, and, when the rank of the reviewing officer entitles him to the honor, each standard salutes at the colonel's command, ***Present saber;*** and again in passing in review when six yards from the reviewing officer. The standard and the guidons are raised at the command, ***Carry saber,*** or when they have passed six yards beyond the reviewing officer.

720. The band of each regiment plays while the reviewing officer is passing in front of and in rear of the regiment.

During the march in reviewing each band, immediately after passing the reviewing officer, turns out of the column, takes post in front of and facing him, continues to play until its regiment has passed, then ceases playing and follows in rear of its regiment; the band of the following regiment commences to play as soon as the preceding band has ceased. The musicians of each regiment, except those pertaining to the regimental and battalion commanders, are consolidated in rear of the band.

If the band be not present the musicians of each regiment with the exceptions above noted, are consolidated and posted in double rank in a position corresponding to that of the band. They conform to what is prescribed for the band, the chief trumpeter taking post and performing the duties of the drum major.

In a single battalion when no band is present, the musicians of the battalion, with the exception above noted, are formed in single rank and posted as prescribed for the buglers of the regiment, conforming to what is prescribed for them.

This rule applies to all ceremonies.

721. If the rank of the reviewing officer entitles him to the honor, the *march* or *flourishes* are sounded by the buglers when sabers are presented, and sounded again in passing in review at the moment the standard salutes, by the buglers halted in front of the reviewing officer.

Buglers with the regimental or battalion commanders do not sound the *march* or *flourishes.*

722. The formation for review may be modified to suit the ground, and the present arms and the ride around the line by the reviewing officer may be dispensed with.

723. If the post of the reviewing officer is on the left of the column the troops march in review with the guide left; the commanding officer and his staff turn out of the column to the left, taking post as prescribed above but to the left of the reviewing officer.

724. Field artillery passes in review at a walk, trot, or gallop. When passing at the trot or gallop no salutes are made except by the commander of the troops when he leaves the reviewing officer.

725. When the command is to pass at an increased gait the band (or musicians if no band be present) remains in front of the reviewing officer and continues to play until the column has completed its second change of direction after passing the reviewing officer. As soon as the increased gait is taken up by the column the band plays in appropriate time, ceasing when the column has again completed the second change of direction after passing the reviewing officer. Upon the completion of the review, the band returns to the position it occupied before marching in review or is dismissed, as may be directed. If there be more than one regiment the band of the last regiment in column remains in front of the reviewing officer; the others turn out of the column when the increased gait is taken up by their respective regiments, and rejoin them, or are dismissed on the termination of the review.

726. In reviews of brigades or larger commands each battalion, after its rear has passed the reviewing officer fifty yards, takes an increased gait for one hundred yards in order not to interfere with the march of the column in rear.

The troops having passed the reviewing officer, return to their camps by the most practicable route, being careful not to delay the march of the troops in rear of them.

727. When field artillery is reviewed in line with cavalry or infantry, it is formed in line with the lead drivers of the pieces aligned on the front rank of the infantry or on the rank of cavalry.

At the command ***Close ranks, March,*** with infantry, or ***Attention, posts,*** with cavalry, the artillery commander commands: 1. ***Attention;*** 2. ***POSTS.*** The chiefs of platoon and standard bearer resume their posts in line.

The forge, store, and kit wagons do not accompany the batteries at the review. If there be no inspection, the mechanics may be assigned for duty as cannoneers.

728. When it is necessary that an organization should be reviewed before an inspector junior in rank to the commanding officer, the commanding officer receives the review and is accompanied by the inspector, who takes post on his left.

SECTION II.—*Battalion Review.*

729. The battalion being in line, the major faces to the front; the reviewing officer takes his post; the major turns about and commands: 1. ***Prepare for review;*** 2. ***MARCH.*** The staff remains in position, facing to the front.

At the command ***March,*** the chiefs of platoons, and the standard bearers if present with the standards, move up on the line of captains. Noncommissioned officers acting as chiefs of platoon do not move up on the line of captains.

The major then faces to the front.

The reviewing officer moves a few yards toward the major and halts; the major turns about, commands: 1. ***Present;*** 2. ***SABER,*** and again turns about and salutes.

The reviewing officer returns the salute; the major turns about, brings the battalion to carry saber and again turns to the front.

The reviewing officer approaches to within about six yards of the major; the latter salutes, returns saber, joins the reviewing officer, takes post on his right and accompanies him around the battalion. The reviewing officer proceeds to the right of the band, passes along the front of the officers to the left of the line and returns to the right, passing in rear of the line. The reviewing officer and those accompanying him salute the standard when passing in front of it.

While the reviewing officer is riding around the battalion the band plays, ceasing when he leaves the right to return to his post.

On arriving again at the right of the line the major salutes, halts, and, when the reviewing officer and staff have passed, moves directly to his post in front of the battalion, faces it, draws saber, and commands: 1. ***Attention;*** 2. ***POSTS.*** The chiefs of platoon and standard bearers execute a left about and take their posts in line. The major commands: 1. ***By the right flank;*** 2. ***MARCH;*** 3. ***Battalion;*** 4. ***HALT.*** The command ***Halt*** is given as soon as the carriages have completed the wheel. The band takes post thirty-six yards in front of the leading battery.

The column being formed, the major commands: 1. ***Pass in review;*** 2. ***Forward;*** 3. ***MARCH;*** 4. ***Guide right.*** At the command ***March*** the column marches off, the band playing. Without command from the major, the column changes direction at the points indicated, and column of batteries at full distances with guide to the right is formed successively to the left at the second change of direction. The major takes his post twenty-four yards in front of the band, immediately after the second change. The band having passed, the reviewing officer turns to the left out of the column, takes post in front of and facing the reviewing officer and remains there until the review terminates.

When the major is six yards from the reviewing officer he and his staff salute, turning the head and eyes sharply to the right. When the major has passed six yards beyond the reviewing officer they resume the carry, turning the head and eyes to the front.

The other officers, noncommissioned staff officers and the drum major, salute at the point prescribed for the major, turning the head and eyes as above described. Noncommissioned officers commanding platoons salute with the hand.

The reviewing officer returns the salutes of the major and of the standard only.

The major, having saluted, takes post on the right of the reviewing officer, remains there until the rear of the battalion has passed, then salutes and rejoins his battalion. The band ceases to play when the column has completed its second change of direction after passing the reviewing officer.

When the battalion arrives at its original position in column the major commands: 1. ***Trot*** (or ***Gallop***); 2. ***MARCH.***

The battalion passes in review as before, except that the cannoneers' arms are not folded and that no salutes are rendered, except by the major when he leaves the reviewing officer.

The review terminates when the rear battery has passed the reviewing officer; the band then ceases to play and rejoins the battalion or is dismissed. The major and his staff rejoin the battalion.

The reviewing officer may prescribe how often the column shall pass in review and the gait or gaits to be used.

Review of a Battalion with Closed Intervals.

730. The battalion is formed in line, each battery being at closed intervals. The review is conducted according to the principles previously explained, except that instead of first forming flank column the battalion is formed in column of batteries with closed intervals but full distances and passes in review in that formation.

SECTION III.—*Regimental Review.*

731. The regiment may be formed in line with full or closed intervals, in line of masses or in such other formation as the nature of the ground and the presence of other troops may necessitate.

When the formation is in line with full intervals, the colonel takes post facing to the front; the reviewing officer takes his post; the colonel turns about and commands: 1. ***Prepare for review;*** 2. ***MARCH.*** The battalions are prepared for review as prescribed under Battalion Review. The review then proceeds as in the battalion review, substituting *colonel* for *major* and *regiment* for *battalion.*

In riding around the regiment, the reviewing officer passes to the left in rear of the line of majors, then returns in rear of the line of carriages to the right.

At the second change of direction each major takes post twenty-four yards in front of his leading battery. When at closed intervals, this distance is suitably reduced.

732. When the regiment is formed in line with closed intervals, the rules for the review of a battalion in line with closed intervals apply.

733. When in line of masses or other formation, the review is conducted according to the same principles, each battery being placed in march in time to follow the preceding one at the proper distance.

SECTION IV.—*Brigade Review.*

734. The brigade is formed and prepared for review as explained for the regiment. The brigade commander and staff take post about thirty yards in front of the line of colonels, when in line; about thirty yards in front of the leading colonel, when in column.

The review is conducted according to the principles laid down for regimental review, the brigade commander taking post twenty-four yards in front of the leading colonel when at about one hundred yards from the reviewing officer.

SECTION V.—*Garrison Review.*

735. A review of a body of troops less than a division, composed of different arms, is conducted on the principles laid down for a regiment.

The senior officer present commands the review; the senior officer present with each arm commands that arm. The troops of each arm form on the line according to the principles prescribed in the Drill Regulations for that arm.

Each commander gives the commands necessary to carry out the orders of the officer commanding the review.

Mounted troops will not be put in march to pass in review until the rear element of the foot troops has completed the second change of direction. The commanding officer, having saluted, turns out and joins the reviewing officer. The other commanders do not turn out of the column.

CHAPTER III.—INSPECTIONS.

SECTION I.—*General Rules.*

736. The inspector prescribes the kind of inspection which he desires.

737. If there be both inspection and review, the inspection may either precede or follow the review.

When an inspection follows a review with the other arms the field artillery proceeds, at the proper time, to the place designated by the inspector and is inspected separately.

SECTION II.—*Battery Inspection, Mounted.*

738. The battery being in double section line, the captain commands: 1. ***Prepare for inspection;*** 2. ***ACTION FRONT.***

At this command the gun sections are unlimbered (par. 223) and prepared for firing (par. 220), the breech blocks being left open until inspected. The chiefs of the third and fourth platoons move their platoons to the rear by a left about and, after gaining sufficient distance to the rear, execute a second left about and form their platoons in double section line abreast of the limbers of the gun sections.

The chiefs of the first and second platoons take post opposite the center and four yards in front of the line of muzzles of their platoons. The chiefs of the third and fourth platoons take post opposite the center and four yards in front of the lead drivers of their platoons.

The limbers and caissons being in position, the captain commands ***Right dress,*** verifies the alignment of the officers and the two ranks of carriages, commands ***Front,*** and posts himself, when not acting as inspector, opposite the center of the battery and eight yards in front of the line of muzzles.

If the forge, store, and kit wagons are present they are formed on the left of the line as an additional platoon under the command of the quartermaster sergeant, and are maneuvered and formed for inspection exactly as prescribed for the third and fourth platoons. The forge and store wagons constitute the right section of this temporary platoon, the kit wagons the left section. While thus assigned the quartermaster sergeant posts himself as prescribed for the platoon commander. The stable sergeant and chief mechanic take the posts prescribed in paragraph 561.

Mechanics and cooks are assigned as cannoneers of the gun and caisson sections when the forge, store, and kit wagons are not present. When the wagons are present the mechanics are posted with the forge and store wagons, the cooks with the kit wagons.

Chiefs of platoon cause all limbers and caissons to be opened for inspection; the quartermaster sergeant causes the forge and store wagons to be similarly opened.

When acting as inspector the captain inspects the chiefs of platoon from right to left; then the quartermaster sergeant, stable sergeant, and chief mechanic; passes by the rear of the battery to the post of the first sergeant and inspects him; thence by the rear of the battery to the right flank, where he returns saber and inspects the musicians and guidon.

He goes to the right section of the right platoon and inspects the section, commencing with the chief of section, passing in order to the caisson, the gun, and the limbers. He then similarly inspects the other sections in order from right to left.

When the captain commences the inspection of the right platoon the chiefs of the other platoons cause their platoons to stand *at ease*, calling them to *attention* as the captain approaches their platoons. Each chief platoon accompanies the captain during the inspection of his platoon. As soon as a platoon is inspected its commander causes it to take the *march order* and then to stand *at ease*. The platoon commander faces his platoon while *at ease*.

The inspection being completed, the captain limbers front and rear and commands: 1. ***Form double section line;*** 2. ***MARCH.***

At the second command each piece inclines to the right, executes a left about, and places itself in double section on the right of its caisson; the chiefs of the third and fourth platoons and the quartermaster sergeant move their platoons in double section up on the line established by the caissons of the gun sections.

739. The battery carries for inspection every article that is prescribed as part of its regular equipment and for which there is a specially designated place assigned on the gun carriage, limber, or caisson.

The battery will be inspected frequently in full marching order.

740. Should the inspector be other than the captain the latter, having prepared his battery for inspection and taken his post, salutes when the inspector arrives in front of him. The inspector returns the salute, inspects the captain, and then inspects the battery in the order just prescribed. As soon as inspected the captain returns saber and accompanies the inspector.

Battery Inspection, Dismounted.

741. The battery being in line, the officers at carry saber, the captain causes the ranks to be opened and commands: 1. ***Inspection;*** 2. ***PISTOL.*** Each man as the inspector approaches him executes *inspection pistol.*

742. The captain returns saber, inspects the chiefs of platoon, the front rank, the rear rank, and the file closers, beginning on the right of each and returning by the left and rear. During the inspection of the ranks the lieutenants face about and stand at ease; they may be directed to accompany the captain or to assist in the inspection. Upon the completion of the inspection the lieutenants face to the front and resume the attention; the captain closes the ranks and dismisses the battery.

743. Should the inspector be other than the captain the latter opens ranks and, when the inspector approaches, brings the battery to attention, faces to the front and salutes. The salute acknowledged, the captain carries saber, faces about, commands: 1. ***Inspection;*** 2. ***PISTOL,*** and again faces to the front.

The inspection proceeds as before; the captain returns saber and accompanies the inspector as soon as the latter has inspected him.

At inspection of quarters the inspector is accompanied by the captain and followed by the other officers, or by such of them as he may designate; the men, without accouterments, stand uncovered near their respective bunks; in camp they stand covered, without accouterments, in front of their tents; upon the approach of the inspector the first sergeant commands: ***ATTENTION,*** salutes and leads the way through the quarters or camp.

SECTION III.—*Battalion Inspection.*

744. The battalion being in column of batteries, in double section, on the approach of the inspector the major commands: 1. ***Prepare for inspection;*** 2. ***MARCH.***

The batteries are prepared for inspection as already prescribed.

The buglers join their batteries. The drum major conducts the band, if there be one, to the rear of the column, passing by the right flank, and places it facing to the front thirty-six yards in rear of the rear battery and opens ranks.

The battalion staff officers place themselves in line with one yard intervals, about forty yards in front of the column, opposite the center, in order of rank from right to left; the noncommissioned staff form in a similar manner six yards in rear of the staff officers; the guard of the standard marches to the front and takes post six yards in rear of the center of the line of the noncommissioned staff. The major takes post in front of the center of the column six yards in front of the staff.

Field and staff officers senior in rank to the inspector do not take post in front of the column, but accompany him.

The inspector inspects the major and, accompanied by the latter, inspects the staff officers.

The major and his staff, as soon as inspected, return saber and accompany the inspector. The noncommissioned staff officers do not return saber until inspected.

The inspector, commencing at the head of the column, inspects the noncommissioned staff, guard of the standard, and band. The noncommissioned staff and guard of the standard may be dismissed as soon as inspected.

The captain of each battery not undergoing inspection dismounts his drivers and brings the men to *rest.* As the inspector approaches the battery the captain brings it to attention and mounts the drivers; as soon as he himself has been inspected he returns saber and accompanies the inspector. The inspector proceeds as in Battery Inspection. At its completion the captain limbers the carriages, forms double section line to the front, dismounts his drivers, and brings the battery to rest. Upon intimation from the inspector the major may direct that each battery in turn be dismissed as soon as inspected.

The band plays during the inspection of the batteries.

When the inspector approaches the band the adjutant commands: 1. ***Inspection;*** 2. ***INSTRUMENTS,*** and the band is inspected as prescribed in paragraph 791.

745. The battalion may be inspected in line. The inspection is conducted according to the same principles as when formed in column. The major and his staff are inspected at their posts in front of the center of the line; the band, which remains at its post on the right, is next inspected; then the batteries in order from right to left.

746. If the major is himself the inspector the inspection is conducted according to the same principles.

SECTION IV.—*Regimental Inspection.*

747. The commands and means are the same as prescribed for a battalion.

In column the staff of the colonel forms in line at intervals of one yard about thirty yards in front of the major of the first battalion, the adjutant on the right, the other staff officers in order of rank from right to left. The lieutenant-colonel is on the right of the staff. In line these officers form similarly sixty yards in front of the center of the regiment. The noncommissioned staff forms in a corresponding manner six yards in rear of the commissioned staff; the guard of the standard takes post six yards in rear of the center of the line of noncommisioned staff. The colonel takes post twelve yards in front of the center of his staff.

The inspector inspects the colonel, and, accompanied by the latter, inspects the lieutenant-colonel and staff officers.

The colonel, lieutenant-colonel, and staff, as soon as inspected, return saber and accompany the inspector.

Commencing at the head of the column, the inspector inspects the noncommissioned staff, guard of the standard, each battalion in succession, and the band.

The major of a battalion not undergoing inspection dismounts his drivers and brings the battalion to rest. On the approach of the inspector the major brings his battalion to attention, mounts the drivers, and accompanies the inspector through his battalion. The inspection is conducted as in Battalion Inspection, each captain dismounting his drivers and resting his battery while not undergoing inspection.

When the inspection of a battalion is completed the colonel, upon intimation from the inspector, may direct that the battalion be marched off and dismissed.

The adjutant gives the necessary commands for the inspection of the regimental noncommissioned staff, guard of the standard, and band.

Each battalion adjutant gives the necessary commands for the inspection of the battalion noncommissioned staff.

CHAPTER IV.—MUSTER.

Regimental, Battalion, or Battery Muster.

748. Muster is held in line or in column of batteries, carriages limbered, drivers and cannoneers mounted.

The adjutant is provided with the muster roll of the field, staff, and band; each captain, with the roll of his battery. A list of absentees alphabetically arranged, showing cause and place of absence, accompanies each roll.

As the mustering officer approaches a battery, its captain commands: ***ATTENTION TO MUSTER.*** The mustering officer or the captain then calls the names on the roll, and as each man's name is called, he answers *Here* and dismounts. After muster the mustering officer verifies the presence of the men reported in hospital, on guard, etc.

If a battery be mustered dismounted the ranks are opened, and as each man's name is called he answere *Here* and steps one yard to the front.

CHAPTER V.—ESCORTS.

SECTION I.—*Escort of the Standard.*

749. The regiment being in line, the colonel details a battery to receive and escort the national standard to its place in line. During the ceremony the regimental standard remains with the guard of the standard at its post with the regiment.

The escort is formed in flank column, the band in front, the national standard bearer at the center of the column. The escort then marches without music to the colonel's office or quarters, is formed in line facing the entrance and halted, the band on the right, the standard bearer midway between the two center sections on a line with the muzzles.

The senior lieutenant, standard bearer, and a sergeant designated by the commander of the escort dismount in front of the colonel's quarters, their horses being held by a bugler. The standard bearer, preceded by the first lieutenant and followed by the sergeant, then goes to receive the standard.

The standard bearer comes out, followed by the lieutenant and sergeant. They mount and form facing the center of the escort, the lieutenant on the right, the sergeant on the left, the bugler returning to his post. The captain then commands: 1. ***Present;*** 2. ***SABER;*** the officers of the escort present saber, the musicians with the band sounding *to the standard*, and the guidon saluting.

The sabers are brought to the carry; the lieutenant and sergeant return to their posts; the battery executes *by the right flank*, the band conforming to the movement, the standard bearer placing himself at the center of the column.

The escort marches with the guide left back to the regiment, the band playing. The march is so conducted that when the escort arrives at fifty yards in front of the right of the regiment the direction of the march shall be parallel to its front. When the standard arrives opposite its place in line the escort is formed in line to the left and halted. The standard bearer, passing between the carriages, advances and halts twelve yards in front of the colonel.

The standard bearer having halted, the colonel, who has posted himself forty yards in front of the center of his regiment, faces the line and commands: 1. ***Present;*** 2. ***SABER***. At this command officers and noncommissioned staff officers present saber. The regimental standard and the guidons execute the prescribed salute. The colonel faces to the front and salutes, the musicians sounding *to the standard*. As soon as the colonel has saluted the national standard bearer executes the prescribed salute.

The colonel then faces about and commands: 1. ***Carry;*** 2. ***SABER***. At the second command the carry is resumed. The standard bearer moves at a walk toward the regiment, and passing by the left of the guard of the standard executes a left about and takes his place in the guard.

The escort presents and carries saber, with the regiment, at the command of the colonel. As soon as the standard has reached its place in line the captain forms the escort in column and marches it, preceded by the band, to its place in line, passing around the left flank of the regiment.

The band plays until the escort passes the left of the line, when it ceases playing and returns to its place on the right, passing in rear of the regiment.

The regiment may be brought to *rest* after the escort has passed the left of the line.

750. If but one battalion of the regiment is present, *escort of the standard* is executed according to the same principles.

751. If it is impracticable for the battery detailed as escort to approach the colonel's quarters or office and to form opposite it as above described, then the battery is marched to the most suitable place near by and there formed. The standard is then brought out as before, and is similarly saluted and received by the escort.

SECTION II.—*Funeral Escort.*

752. The composition and strength of the escort are prescribed in Army Regulations.

The escort is formed with its center opposite the quarters of the deceased, the gun squads in front, the band (or musicians) on that flank of the escort toward which it is to march.

Upon the appearance of the coffin the commander of the escort commands: 1. ***Present;*** 2. ***SABER,*** and the band plays an appropriate air; sabers are then brought to the carry.

The cannoneers are then mounted and the escort is formed in flank or section column.

The procession is formed in the following order: 1. Music; 2. Escort; 3. Clergy; 4. Coffin and pallbearers; 5. Mourners; 6. Members of the former command of the deceased; 7. Other officers and enlisted men; 8. Distinguished persons; 9. Delegations; 10. Societies; 11. Civilians.

Officers and enlisted men (Nos. 6 and 7), with side arms, are in the order of rank, seniors in front.

The escort marches at a walk to solemn music, and on arriving at the grave is formed in line with the center opposite the grave; the gun squads are next brought to the front; the coffin is then carried along the front of the escort to the grave, sabers are presented, and the band plays an appropriate air; the coffin having been placed over the grave, the music ceases and sabers are carried.

The commander next commands: 1. ***Parade;*** 2. ***REST.***

At the second command the gun squads execute *parade rest* and incline the head.

After the coffin is lowered into the grave and the funeral services are completed the commander of the escort commands: 1. ***Battery*** (or ———); 2. ***ATTENTION,*** orders the cannoneers to take their posts and then fires three salvos with blank cartridges. After the last salvo a bugler sounds taps over the grave.

The escort is then formed into column, marched to the point where it was assembled, and dismissed.

The band does not play until it has left the enclosure.

The funeral ceremony for an enlisted man is the same as for as officer, except that the commands ***Present*** and ***Carry saber*** are omitted; the sergeant in command of the escort salutes with the hand on the appearance of the coffin at the quarters of the deceased and also when the coffin is carried along the front of the escort to the grave.

753. When the distance to the place of interment is considerable, the escort after leaving the camp or garrison may march *at ease* until it approaches the burial ground, when it is brought to attention. The music does not play while marching *at ease.*

In marching at attention the field music may alternate with the band in playing.

754. When it is impracticable for the carriages to approach the grave, they are left outside the enclosure. If the escort consists of artillery only, the officers, noncommissioned staff officers, first sergeants, quartermaster sergeants, stable sergeants, and musicians dismount, turn over their horses to the drivers, and the officers and noncommissioned staff officers draw saber; the gun squads are next formed in column of squads; the coffin is then escorted to the grave, where line is formed and the same ceremonies are performed as before prescribed. The ceremony at the grave having been completed, the gun squads are marched to the guns and three salvos are fired; after the last salvo a musician sounds taps over the grave.

755. Should the entrance to the cemetery prevent the hearse accompanying the escort till the latter halts at the grave, the column is halted at the entrance long enough to take the coffin from the hearse, when the column is again put in march. The cavalry and artillery of the escort, when unable to enter the enclosure, turn out of the column and salute the coffin as it passes.

756. In all funeral ceremonies six pallbearers will be selected as far as practicable from the grade of the deceased. If the deceased is a commissioned officer, the coffin is borne by six noncommissioned officers; if a noncommissioned officer or private, by six privates.

757. When arms are presented at the funeral of a general officer, the field music sounds the *march* or *flourishes*, according to the rank of the deceased, after which the band plays an appropriate air.

After the remains are deposited in the grave a salute corresponding to the rank of the deceased will be fired, in addition to three salvos of artillery or three volleys of musketry.

758. At the funeral of a mounted officer or enlisted man, his horse, in mourning caparison, follows the hearse.

759. When necessary to escort the remains from the quarters of the deceased to the church before the funeral service, arms are presented upon receiving the remains at the quarters and also as they are borne into the church.

760. Before the funeral the commander of the escort gives the clergyman and pallbearers all needed directions.

CHAPTER VI.—PRESENTATION TO THE STANDARD.

761. At least once a year the recruits of the regiment will be formally presented to their standard.

For this purpose the regiment will be formed in line of masses dismounted, the recruits who have joined since the last presentation being posted on the left of their respective batteries. At an intimation from the adjutant, and under his supervision, the recruits of each battery are marched to the front and center by noncommissioned officers designated for the purpose, and formed in line midway between the colonel and the regiment. The noncommissioned officers, after halting and aligning their squads, take post in the line of file closers.

The national and regimental standards are brought by the guard of the standard from the colonel's quarters or office and posted twelve yards in front of the colonel facing him, when honors are rendered as in the ceremony of *escort of the standard.*

On the conclusion of the Salute the colonel faces about and addresses the recruits in remarks appropriate to the occasion. He then commands: 1. ***Carry;*** 2. ***SABER;*** 3. ***DISMISS YOUR BATTERIES.*** The standard is escorted by the guard of the standard to the colonel's office or quarters; the squads are marched to the batteries, and the batteries are marched off by their captains and dismissed.

CHAPTER VII.—BATTERY GUARD MOUNTING.

762. At the *assembly* the men warned for stable and park guard duty fall in on the battery parade ground in two ranks, facing to the front; the noncommissioned officers and supernumerary fall in as file closers; the first sergeant then verifies the detail, inspects the dress and general appearance of the men, and replaces by the supernumerary any man unfit to march on guard. If the supernumerary be no longer required, he is dismissed.

763. The musicians take post on the battery or garrison parade ground.

At *adjutant's call* the new battery officer of the day, who mounts the guard, takes post so as to be six yards in front of and facing the center of the guard when formed.

The first sergeant marches his detail to the parade ground, the musicians sounding a march in quick time, and halts the detail in line so that the front rank man of the right file shall be two yards to the left of the left musician; he then places himself two yards in front of the center of the detail, salutes, and reports to the officer: ***Sir, the detail is correct;*** or ***Sir,*** (so many) ***noncommissioned officers and privates are absent;*** he then faces to the left and takes post two yards to the left of the front rank.

The officer then draws saber and commands: 1. ***Open ranks;*** 2. ***MARCH.***

At the command ***March*** the ranks are opened, the front rank dresses to the right, the rear rank steps back two yards, halts, and dresses to the right; the senior noncommissioned officer places himself on the right of the front rank; the other noncommissioned officers two yards in rear of the rear rank. The officer verifies the alignment of both ranks and commands: ***FRONT,*** and 1. ***Inspection;*** 2. ***PISTOL,*** returns his saber, and inspects the guard.

If any man does not present a creditable appearance the officer directs the first sergeant to replace him after the guard is mounted.

The inspection being finished, the officer places himself six yards in front of and facing the center of the guard, draws his saber, and commands: 1. ***Parade;*** 2. ***REST;*** 3. ***SOUND OFF,*** and comes to a parade rest.

The musicians sound off, remaining on the right of the guard.

The officer then comes to a carry and commands: 1. ***Guard;*** 2. ***ATTENTION;*** 3. ***Close ranks;*** 4. ***MARCH;*** 5. ***Guard to its post;*** 6. ***Right;*** 7. ***FACE;*** 8. ***Forward;*** 9. ***MARCH.***

At the ninth command the guard moves to its post, preceded by the musicians, who sound a march in quick time; the senior noncommissioned officer marches near its left and rear, so as to observe its movements; if there be a file closer he takes his place as guide. The officer returns saber; the first sergeant salutes, and the officer returns the salute; they then retire.

764. As the new guard approaches the guardhouse the old guard is formed in line, its commander on the right of the front rank; when the new guard arrives nearly opposite it, the commander of the old guard salutes.

The new guard marches in quick time past the old guard, the commanders saluting.

The musicians having marched three yards beyond the right of the old guard, change direction to the right and, followed by the guard, change direction to the left when on a line with the file closers of the old guard; the changes of direction are without command. The commander of the new guard halts on the line of the front rank of the old guard and allows his guard to march past him; when its rear, after having changed direction to the left, approaches, he halts the guard, faces it to the left, places himself three yards to the right of the old guard and in line with its front rank, and then dresses the guard to the left; the buglers are two yards to the right of its front rank.

The new guard being dressed, the commanders of the old and new guard look toward each other and salute.

765. The commander of the new guard now divides the guard into three reliefs, numbers them *first*, *second*, and *third* from right to left, and directs a list of the guard to be made; he then takes possession of the guardhouse or guard tent and the articles and prisoners under charge of the guard.

While the sentinels are being relieved the two guards stand at ease and the commander of the old guard gives to the commander of the new guard all the information and the instructions relating to his guard.

766. The first relief having been designated, its corporal commands: ***CALL OFF.*** Beginning on the right the men call off alternately in the rear and front rank: *One*, *two*, *three*, *four*, and so on; the corporal then commands: 1. ***Right;*** 2. ***FACE;*** 3. ***Forward;*** 4. ***MARCH.***

The corporal marches on the left and near the rear file in order to observe the march. The corporal of the old guard marches on the right of the leading rank and takes command when the last one of the old sentinels is relieved, changing places with the corporal of the new guard.

When the relief arrives at fifteen yards from a sentinel he halts and faces toward it; at six yards from him the corporal commands: 1. ***Relief;*** 2. ***HALT.*** The corporal then adds, according to the number of the post: 1. ***Number*** (———); 2. ***POST.***

The new sentinel approaches the old and halts at about one yard from him. The old sentinel, under supervision of both corporals, gives in a low tone his instructions to the new sentinel.

The corporal then commands: 1. ***Forward;*** 2. ***MARCH.***

As the relief passes, the old sentinel takes his place in rear; the other sentinels are relieved in a similar manner.

The sentinel at the guardhouse is the first relieved and is left behind.

767. The sentinels of the old guard having come in, form on its left; the musicians place themselves two yards to the right of the old guard on line with the front rank; the commander of the old guard places himself two yards in front of its center; the commander of the new guard places himself on the right of its front rank; the commander of the old guard then marches it with the guide right six yards to the front, when he commands: 1. ***By the right flank;*** 2. ***MARCH.*** At the command ***March*** the guard faces to the right, the musicians begin to sound, and the guard marches in quick time past the new guard, the commanders of both guards saluting; the old guard is then marched to the battery parade ground and dismissed.

The commander of the new guard then makes himself acquainted with all the instructions for his guard, visits the sentinels and questions them relative to the instructions they have received from the old guard.

768. The battery officers of the day visit and inspect the guardhouse or tents while the old guard is being relieved, verify the number of prisoners, and then proceed to the office or presence of the battery commander, who receives the report of the old officer of the day, relieves him, and gives his instructions to the new officer of the day.

769. In visiting the guardhouse each officer of the day is saluted by the commander of his own guard.

When other officers entitled to a salute approach, the commander of each guard salutes.

770. In rendering honors the guard is brought to *attention* and the commander salutes.

771. In bad weather, at night, or after long marches the music may be dispensed with at the discretion of the battery commander.

CHAPTER VIII.—MISCELLANEOUS.

SECTION I.—*The Guidon.*

MANUAL OF THE GUIDON.

772. *The position of carry guidon, dismounted.*—The lance of the guidon is held vertically in the right hand, thumb in front of the lance, forefinger along the side, ferrule about six inches from the ground. It is thus carried in marching.

When leading the horse the lance is held in a corresponding position in the left hand.

773. *The position of order guidon.*—The ferrule of the lance rests on the ground on a line with and touching the toe of the right shoe; the right hand grasps the lance in the same manner as when at a carry.

774. *The position of parade rest.*—The ferrule of the lance is on the ground as at the order; the lance is held with both hands in front of the center of the body, left hand uppermost.

775. *To mount and dismount; the position of carry guidon, mounted.*—At stand to horse the ferrule of the lance rests on the ground on a line with and touching the toe of the left shoe, lance vertical and supported by the left hand; hand at the height of the neck, elbow and forearm closed against the lance.

Preparatory to mounting, grasp the reins and a lock of the mane in the left hand, lance held in the same hand, reins on the near side of the lance; place the right hand on the pommel and mount in the usual manner. After mounting, grasp the lance with the right hand under the left, which lets go of it without quitting the reins; carry the lance to the right side, lower and place the ferrule in the stirrup socket. The right hand then grasps the lance, forearm nearly horizontal, the arm through the sling, lance vertical; this is the position of *carry guidon, mounted.*

Dismounting with the guidon is executed in a manner the reverse of the foregoing.

776. *Salutes.*—Being mounted: Lower the guidon to the front until the lance (under the right arm) is horizontal.

Being dismounted: Slip the right hand up the lance as high as the eye, then lower the lance to the front by straightening the right arm to its full extent.

If marching, the salute is executed when at six yards from the officer entitled to the salute; the carry is resumed after passing six yards beyond him.

At the halt the salute is executed at the command ***Present saber;*** the carry is resumed at the command ***Carry saber.***

SECTION II.—*The Standard.*

777. Whenever in these regulations the term *the standard* is used it includes both the national and the regimental standards; if either alone is to be referred to, the term *the national standard* or *the regimental standard* is used.

778. The manual of the standard is as prescribed for the guidon except that at carry standard, dismounted, the ferrule of the lance is supported at the right hip.

The standard salutes in the ceremony *escort of the standard* and when saluting an officer entitled to the honor, but in no other case.

779. *The guard of the standard.*—The guard of the standard consists of the color sergeants and of two experienced men selected by the colonel. The guard is habitually formed in line, the color sergeants in the center.

The national standard is carried by the senior color sergeant, who is nearest to the right flank of the guard and who commands the guard. The regimental standard is carried by the other color sergeant. The latter conforms to the movements of the former, maintaining his position on the left.

The standard, kept at the quarters or office of the colonel, is escorted by the guard to the place of formation of the regiment and is similarly returned.

780. *Post of the standard.*—At the formation of the regiment, as soon as the battalions have taken their places, the guard of the standard takes post midway between the two battalions—in line, abreast of the lead drivers of the leading carriages; in column, at the center of the column.

If the formation of the regiment is changed from line to column or the reverse, the standard conforms to the movement, taking its new position by the most direct route.

When during exercises the regimental formation is broken up, the standard joins the colonel or is dismissed, as may be directed by the adjutant.

If the regiment is subdivided for action, the standard takes post as directed by the adjutant.

If only one battalion of the regiment is present, the standard takes post at the formation midway between the center and left (or rear) batteries of the battalion. If the order of the batteries in line or column is reversed, it maintains its relative position with respect to these two batteries. The standard conforms in other respects to what is above prescribed.

SECTION III.—*The Saber.*

781. Officers, regimental and battalion noncommissioned staff officers and the drum major are armed with the saber.

At ceremonies sabers are habitually drawn. In route marches they are habitually in the scabbard. At other times they are drawn or in the scabbard in the discretion of the officer in command; when he draws or returns saber, officers and noncommissioned staff officers under his command draw and return saber with him.

For dismounted duty the saber is attached to the belt, and is kept hooked up except when drawing and returning saber.

For mounted duty the saber is habitually attached to the left side of the saddle; in full dress it is attached to the belt, unless otherwise directed by the commanding officer. The saber is not removed from the saddle when dismounting temporarily for the performance of some duty on foot.

782. *To draw the saber; the position of carry saber.*—Unhook the saber with the thumb and first two fingers of the left hand, thumb on the end of the hook, fingers lifting the upper ring; grasp the scabbard with the left hand at the upper band, bring the hilt a little forward, seize the grip with the right hand and draw the saber quickly, raising the arm to its full extent to the right front at an angle of about forty-five degrees with the horizontal, the saber, edge down, in a straight line with the arm; make a slight pause and bring the back of the blade against the shoulder, edge to the front, arm nearly extended, hand by the side, elbow back, third and fourth fingers back of the grip; at the same time hook up the scabbard with the thumb and first two fingers of the left hand, thumb through the upper ring, fingers supporting it; drop the left hand by the side. *This is the position of carry saber dismounted.*

To draw the saber when mounted, reach with the right hand over the bridle hand, and, without the aid of the bridle hand, draw the saber as before. The right hand at the carry rests on the right thigh.

783. The saber if drawn is, while at attention, habitually held at the carry, except when dismounted and moving in double time; in the latter case it is carried diagonally across the breast, edge to the front, the left hand steadying the scabbard.

784. Being at carry saber: 1. ***Present;*** 2. ***SABER.***

For officers: At the command ***Present*** raise and carry the saber to the front, base of the hilt as high as the chin and six inches in front of the neck, edge to the left, point six inches farther to the front than the hilt, thumb extended on the left of the grip, all the fingers grasping the grip. At the command ***Saber*** lower the saber, point in prolongation of the right foot and near the ground, edge to the left, hand by the side, thumb on left of grip, arm extended. If mounted, the hand is lowered behind the thigh, point a little to the right and front of the stirrup.

For enlisted men: Execute at the command ***Saber*** what is above prescribed for officers at the command ***Present,*** and retain the saber in the raised position until the second command of ***Carry saber.***

785. Being at present saber: 1. ***Carry;*** 2. ***SABER.***

At the command ***Saber,*** resume the position of carry saber.

786. Being at carry saber: 1. ***Parade;*** 2. ***REST.***

Take the position of parade rest (par. 49), point of saber on or near the ground in front of the center of the body, edge to the right.

At the command ***Attention,*** resume the carry saber and the position of the soldier.

787. *To return saber.*—Carry the right hand opposite to and six inches from the left shoulder, saber vertical, edge to the left; at the same time unhook and lower the scabbard with the left hand and grasp it at the upper band; drop the point to the rear and pass the blade across and along the left arm; turn the head slightly to the left, fixing the eyes on the opening of the scabbard, raise the right hand, insert and return the blade; turn the head to the front, drop the right hand by the side, hook up the scabbard with the left hand, drop the left hand by the side.

When mounted the saber is returned without using the left hand.

788. At inspection enlisted men, with the saber drawn, execute at the approach of the inspector the first motion of ***Present saber*** and turn the wrist to show the other side of the blade, resuming the carry when the inspector has passed.

SECTION IV.—*The Band.*

789. The band is generally formed in column of fours. It may be formed in two or more ranks.

Dismounted, the band is formed in two or more ranks, with sufficient intervals between the men and distances between the ranks to permit a free use of the instruments.

The drum major is three yards (dismounted, two yards) in front of the center of the front rank. He gives the commands or signals for its movements. The commands are the same as for a squad, substituting in them *band* for *squad.*

In line the band is posted with the left of its front rank thirty-six yards to the right of the right battery. In column it marches with its rear rank thirty-six yards in front of the leading battery or its front rank thirty-six yards in rear of the rear battery, according as the column has been formed to the right or the left.

Dismounted, the band takes post as when mounted.

When united the musicians form in rear of the band. When the band is not present the posts, movements, and duties of the musicians are the same as prescribed for the band.

In rendering honors, whenever the standard salutes, the musicians sound the *march, flourishes* or *to the standard,* at a signal from the drum major.

In marching the different ranks dress to the right.

When the command with which the band is posted faces to to the rear the band executes the countermarch. The intervals are increased before executing a countermarch and closed upon the completion of the countermarch.

In executing the countermarch, the men in the leading rank, or four to the right of the drum major, turn individually to the right about, and those to his left to the left about, each followed by the men covering him in the column. The drum major passes through the center.

In dismounted formations, when right, left, or about face is executed, the band faces in the same manner.

Signals of the Drum Major.

790. The signals for the movements of the band will correspond to the saber signals (par. 584) as far as practicable.

Prepare to play: Take the first position of present saber.

Play: Thrust upward energetically with the saber, arm fully extended, and quickly resume the carry.

Prepare to cease playing: Same as prepare to play.

Cease playing: Same as play.

The march or flourishes.—1. *Prepare to play:* Raise the hand to the height of the forehead and hold the saber in a horizontal position, point to the left.

2. *Play:* Lower the hand quickly to the belt and resume the carry.

Increase intervals: Extend the arm to the front, and wave the saber several times to the right and left in front of the body.

To Inspect the Band.

791. Being at the halt: 1. ***Open ranks;*** 2. ***MARCH;*** 3. ***FRONT.***

The front rank dresses to the right; the other ranks move backward, each taking the distance of three yards (dismounted, two yards) from the rank preceding, halt and dress to the right.

1. ***Inspection;*** 2. ***INSTRUMENTS.***

Each musician, as the inspector approaches him, raises his instrument in front of his body, reverses it so as to show the other side, and then returns it to its former position.

A bugler, when inspected, executes with his bugle what is prescribed for a band musician.

1. ***Close ranks;*** 2. ***MARCH.***

The front rank stands fast, the other ranks move up and close to the proper distance.

SECTION V.—*Honors.*

792. The officers named below are received with standards and colors drooping, officers and troops saluting, and the bands and field music playing, as follows: The President, the President's March; the General, the General's March; the Lieutenant-General, bugles sounding three flourishes or drums beating three ruffles; a major-general, two flourishes or two ruffles; a brigadier-general, one flourish or one ruffle.

793. To the Vice-President, the members of the Cabinet, the Chief Justice, the President of the Senate, the Speaker of the House of Representatives, American or foreign ambassadors, and governors within their respective States and Territories, the same honors are paid as to the General; to the Assistant Secretary of War and to American or foreign envoys or ministers, the same honors as to the Lieutenant-General; to officers of the Navy, the honors due to their relative rank; to officers of marines and volunteers, and militia when in the service of the United States, the honors due to like grades in the regular service; to officers of a foreign service, the honors due to their rank.

794. The national or a regimental color or standard, uncased, passing a guard or other armed body is saluted, the field music sounding *to the color* or *to the standard.* Officers or enlisted men passing an uncased color or standard render the prescribed salute; with no arms in hand the salute is made by uncovering, the headdress being held in the right hand opposite the left shoulder, right forearm against the breast.

795. Whenever "The Star Spangled Banner" is played by the band on a formal occasion at a military station, or at any place where persons belonging to the military service are present in their official capacity, all officers and enlisted men present stand at attention, and if not in ranks render the prescribed salute, the position of the salute being retained until the last note of "The Star Spangled Banner." The same respect is observed toward the national air of any other country when it is played as a compliment to official representatives of such country.

Whenever "The Star Spangled Banner" is played as contemplated in this paragraph, the air will be played through once without the repetition of any part except such repetition as is called for by the musical score.

796. No honors are paid by troops when on the march or in trenches, except that they may be called to attention, and no salute is rendered by troops marching in double time or at the trot or gallop.

797. When armed bodies of troops, or unarmed bodies commanded by commissioned officers, pass each other, except during drills or exercises, they are called to attention, if not already at attention, and the commanders salute, the junior rendering the first salute.

798. Before saluting an armed body troops are always brought to attention.

799. No salutes are rendered between unarmed bodies commanded by noncommissioned officers.

800. If an officer passes a body of troops, except at drills or exercises, compliments are paid as follows:

If the officer is a superior officer of the commander of the troops, the troops are called to attention, if not already at attention, the commander salutes and the officer returns the salute. If the officer is not a superior officer of the commander of the troops, salutes are exchanged, the junior saluting first, and the troops are not called to attention.

801. If an officer or body of troops entitled to salute passes in rear of troops at a halt, the troops are brought to attention but no salutes are rendered.

802. The commander of a body of troops, if a commissioned officer, is saluted by all officers junior in rank and by all enlisted men. The salute is returned by the commander only, who does not call his command to attention if it be not at attention. The commander only is saluted.

803. All officers salute on meeting and in making or receiving official reports. Military courtesy requires the junior to salute first, but when the salute is introductory to a report made at a military ceremony or formation to the representative of a common superior—as, for example, to the adjutant, officer of the day, etc.—the officer making the report, whatever his rank, will salute first; when not otherwise prescribed in ceremonies, the officer to whom the report is made will acknowledge, by saluting, that he has received and understood the report. When under arms the salute is made with the saber if drawn; otherwise with the hand. A mounted officer dismounts before addressing a superior not mounted.

804. On official occasions officers, when indoors and under arms, do not uncover, but salute with the saber if drawn; otherwise with the hand. If not under arms, they uncover and stand at attention, but do not salute except when making or receiving reports.

805. An enlisted man not in ranks, whether in uniform or not, salutes all officers when within saluting distance; the salute is made when dismounted with the hand farthest from the officer; when mounted, with the right hand.

Officers are saluted whether in uniform or not.

806. A noncommissioned officer or private in command of a detachment salutes with the hand. A noncommissioned staff officer armed with the saber, when in command of a detachment or out of ranks, salutes with the saber if drawn; otherwise with the hand.

807. An enlisted man, if seated, rises on the approach of an officer, faces toward him, and salutes. If standing, he faces the officer for the same purpose. If the parties remain in the same place or on the same ground, such compliments need not be repeated. Soldiers actually at work do not cease work to salute an officer unless addressed by him; if addressed, they stand at attention and salute.